USDA-FOREST SERVICE

FS-2500-8 (7/08)
Date of Report: 1/16/18

DRAFT THOMAS BURNED AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

The Thomas Fire of 2017 looking at Santa Paula River drainage.

A. Type of Report

[x] 1. Funding request for estimated emergency stabilization funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[ ] 1. Initial Request (Best estimate of funds needed to complete eligible stabilization measures)

[x] 2. Interim Report # 1
[ ] Updating the initial funding request based on more accurate site data or design analysis
[ ] Status of accomplishments to date

[ ] 3. Final Report (Following completion of work)

The US Forest Service Burned Area Emergency Response (BAER) team's purpose is to assess the threats to life, property, and cultural and natural resources from fire induced changes to the watershed that can cause erosion, sedimentation, rockfall, flooding, and debris flows. The BAER team has analyzed the entire Thomas Fire for post-fire conditions and this predictive assessment of changed soil conditions is shared with all entities affected by the fire. This report is a synopsis of BAER findings and the Forest Service's internal request for implementation funding to treat values at risk **on Forest Service lands only**. It includes a summary of the technical reports generated by the BAER team and potential pre-rain mitigations for values managed by the Forest Service. Complete technical reports will be made available through the Santa Barbara and Ventura Offices of Emergency Management. Information generated by the BAER team is crucial for further analysis by other agencies affected by the fire to examine their values at risk occurring off-Forest. Pre-rain mitigation treatments on non-Forest lands are the responsibility of the managers/owners of those values, but the Forest Service will cooperate with other agencies to implement treatments if they must occur on lands managed by the Forest Service.

Forest Service lands that burned are very steep and remote with many values at risk both on FS land and immediately downstream such as the Wheeler Gorge, Rose Valley, and Big Cone Campgrounds, Dos Pueblos Ranch, Montecito, and Ojai subdivisions, drinking water for the city of Goleta, Santa Barbara, Montecito, and Carpentaria, storage capacity of Casitas and Jameson Reservoirs, the roads leading to FS trailheads, hiking trails, native plants, fish, wildlife, and numerous cultural resources. Work to prepare these values at risk on Forest represents a small portion of the implementation work that will need to be done on the lands surrounding the National Forest; that is being addressed by the WERT team. Natural Resource Conservation Service, Bureau of Reclamation along with many land owners who will use the information that the Forest Service has generated across the total burn area to focus their work. Reports from these agencies will be posted when then are completed.

During the first week of December of 2017 the BAER team initiated a cooperative effort with the California Watershed Emergency Response Team and other agencies to facilitate and participate in an assessment of all values at risk. The Thomas Fire started on December 4 and by December 5 had burned onto the Los Padres National Forest near Santa Paula Canyon on the Ojai Ranger District. On the night of December 7 the fire burned the watersheds above Ojai and continued burning rapidly to the west. Because of the impending rainy season, the LPNF BAER coordinator initiated a rapid BAER assessment for the extremely steep, debris flow prone areas above Ojai. A soil burn severity map and debris flow map were produced and shared with officials from the City of Ojai and Ventura County on December 14. Pre-storm road work began immediately. At this time the Thomas Fire was still moving to the north and west toward the East Camino Cielo Ridge above the densely populated areas of Carpentaria and Montecito so the LPNF dispatched the second and third USFS BAER teams. The second was an advanced team starting Dec. 26 to create the soil burn severity map for the entire fire and to work with USGS to produce the debris flow map so that all ensuing agency teams could immediately start VAR analysis. A third team started Jan. 3 to assess the values at risks (VARS) on National Forest lands beyond the first Ojai assessment, recommend treatments for those VARS, and to coordinate with the WERT team and other agencies. The WERT team mobilized a full team January 3 to cover front country values at risk. The Los Padres Forest BAER liaison and Regional Forest Service BAER coordinator established a watershed assessment group of cooperating agencies on December 8 to co-ordinate assessment, information transfer, and to update communities at risk. This group began daily calls on December 18 and met in person on Jan. 3 in Ventura County OEM when all of the assessment teams were in place. Agencies in this group include:

- USFS BAER team
- California WERT team
- California Office of Emergency Services

- Santa Barbara County Office of Emergency Management
- Santa Barbara County Water Resources Division
- Ventura County Office of Emergency Management
- Ventura County Watershed Protection District
- NOAA Weather Service
- US Geological Survey
- Natural Resource Conservation Service
- Cal Fire
- California Geological Survey
- Federal Emergency Management Agency

These agencies then disseminated updated daily information out to their offices and other local agencies such as city governments, Caltrans, public utilities, and municipal water agencies.

The USFS BAER team embedded themselves with the Santa Barbara County Office of Emergency Management on Jan. 3 and worked in their office so that all information on risks to the public could be transmitted without any delay to both counties. The WERT team office was in Ventura County OEM to similarly coordinate with both counties. Maps of Values at Risk were completed and shared with the counties before the storms. By January 5 a significant storm event was forecast to hit the Thomas burn area on the evening of Jan. 8 that was forecast to produce rainfall intensities of 0.5 t 1.5 inches/hour. These intensities were greater than the predicted threshold of debris flows (28mm/hr for 15 minutes), so that day the BAER and WERT liaisons attended a press release to discuss the impending hazards to the Carpentaria and Montecito areas, and attended meetings at the Santa Barbara County OEM to provide supporting information on our debris flow/flood assessments and values at risk. After these meetings the Santa Barbara County OEM issued mandatory and voluntary evacuation orders for Montecito. On the morning of Jan. 9 a 200 year storm that rained up to 6 inches/hr for short periods initiated a very large debris flows in canyons above Montecito that flowed through town resulting in extensive damage to homes and roads and causing 20 fatalities (at the time of this report). These debris flows changed future flood/debris flow conditions in Montecito that needed re-evaluation. The WERT team immediately began evaluation of the changed watershed conditions above and within Montecito and continue that effort to further prepare Montecito for upcoming rain events as of January 15. This effort is supported by the information generated by the BAER team but the changed conditions occur almost entirely off lands managed by the Forest Service, and the WERT team increased their staff to cover this updated analysis and did not require further input from the BAER team.

The BAER team finalized their reports for this assessment on Jan 16 and will share those with Santa Barbara and Ventura OEM offices. The BAER liaison will continue to participate in flood preparedness information sharing from the BAER assessment of flood conditions.

The USFS BAER liaison facilitated meetings and calls through January 14 at which time they were transferred to California Office of Emergency Services to carry out further analysis and information transfer.

Costs have been redacted from this version to protect the contracting process..

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Thomas Fire

B. Fire Number: CA-VNC-103156

C. State: CA

D. County: Santa Barbara/Ventura

E. Region: 5 F. Forest: Los Padres

G. Districts: Santa Ynez/Ojai Management Units H. Fire Incident Job Code: PNLH77

I. Date Fire Started: Dec 4, 2017

J. Date Fire Contained: pending

K. Suppression Cost: $205+ million

L. Fire Suppression Damages Repaired with Suppression Funds
1. Dozerline repaired / waterbarred: 160 out of 280 miles as of 01/9/2018
2. Hand line repaired: 30 out of 86 miles as of 01/9/2018

M. Watershed Number and Name:

Soil Burn Severity by Modified 6th-Field Subwatersheds affected by the Thomas Fire.

HUC 6 12 digit ID	HUC 6 Watershed Name	Acres	Unburned	Low	Moderate	High	Acres Burned at Moderate and High SBS within watershed
180701020701	Abadi Creek-Sespe Creek	29,702	5,679	2,568	1,502	35	5%
180701020903	Adams Canyon-Santa Clara River	36,655	2,996	12,222	8,230	2	22%
180600100201	Agua Caliente Canyon	21,599	242	445	735	6	3%
180701010203	Arundell Barranca-Frontal Pacific Ocean	19,024	800	4,335	2,685	11	14%
180600100203	Blue Canyon-Santa Ynez River	10,081	155	297	940	2	9%
180701020706	Boulder Creek-Sespe Creek	22,520	2308	4,015	3,449	0	15%
180600130204	Carpinteria Creek	11,272	49	1,350	6,674	48	60%
180701010105	Coyote Creek	26,437	1,156	7,380	12,414	217	48%
180600100401	Gibraltar Reservoir-Santa Ynez River	32,186	2	2	0		0%
180701020904	Harmon Canyon-Santa Clara River	24,914	902	3,790	1,028		4%
180600100202	Juncal Canyon-Santa Ynez River	18,280	273	1,625	15,098	214	84%

180701010202	Los Sauces Creek-Frontal Pacific Ocean	41,854	902	3,782	5,986	363	15%
180701010106	Lower Ventura River	26,183	923	1,419	1,510	3	6%
180701010101	Matilija Creek	34,931	2,688	4,739	26,735	754	79%
180600130203	Mission Creek-Frontal Santa Barbara Channel	69,931	536	1,585	5,310	49	8%
180701010102	North Fork Matilija Creek	10,287	448	1,962	7,764	47	76%
180701020703	Piedra Blanca Creek-Sespe Creek	37,079	268	317	318	0	1%
180701010201	Rincon Creek	9,357	501	2,505	4,799	11	51%
180701010103	San Antonio Creek	32,750	6,746	7,997	10,618	57	33%
180600130205	Santa Monica Creek-Frontal Santa Barbara Channel	27,721	99	1,140	3,511	13	13%
180701020901	Santa Paula Creek	29,014	2,914	6,965	14,182	640	51%
180701020902	Timber Canyon-Santa Clara River	23,334	732	2,749	3,155	2	14%
180701020702	Tule Creek-Sespe Creek	31,513	1,573	2,975	9,067	249	30%
180701010104	Upper Ventura River	13,807	2,049	2,135	1,785	0	13%
180701020705	West Fork Sespe Creek-Sespe Creek	40,017	161	258	631		2%
180701020701	Abadi Creek-Sespe Creek	29,702	5,679	2,568	1,502	35	5%
180701020903	Adams Canyon-Santa Clara River	36,655	2,996	12,222	8,230	2	22%

N. Total Acres Burned: Thomas Fire Assessment Area: 281,893
(NFS Acres 180,411; Private 98,663; OTHER 2,819)

Ownership	Soil Burn Severity					
	Unburned	Low	Moderate	High	Total Acres	Percent Ownership
Bureau of Land Management	14	116	76	0	206	0.0732
Bureau of Reclamation	496	2237	1957	2	4693	1.6648
California Department of Fish and Wildlife	11	0			11	0.0040
Montecito Water District	16	142	179	0	337	0.1195
Ojai, City of	27	23			49	0.0174
Other State	1	10	26		37	0.0132
Private	20258	55312	46101	415	122086	43.3114
Santa Barbara Flood Control and Water Conserv. District	0	2	0		2	0.0008
Santa Barbara, City of	109	138	1154	13	1414	0.5017
Santa Barbara, County of		1	0		1	0.0004
Unknown Federal	43	98	218	1	361	0.1279
USDA Forest Service	15978	29741	104084	2297	152100	53.9594
Ventura, City of	31	147	47	1	225	0.0797
Ventura, County of	145	144	68		357	0.1266
Total Acres	37128	88111	153910	2729	**281878**	

O. Vegetation Types: The dominant vegetation communities within the fire perimeter include:

- Coastal Sage Scrub
- Chaparral

- Oak Woodland

Vegetation communities were classified based on information obtained from CALVEG (USDA, 2009).

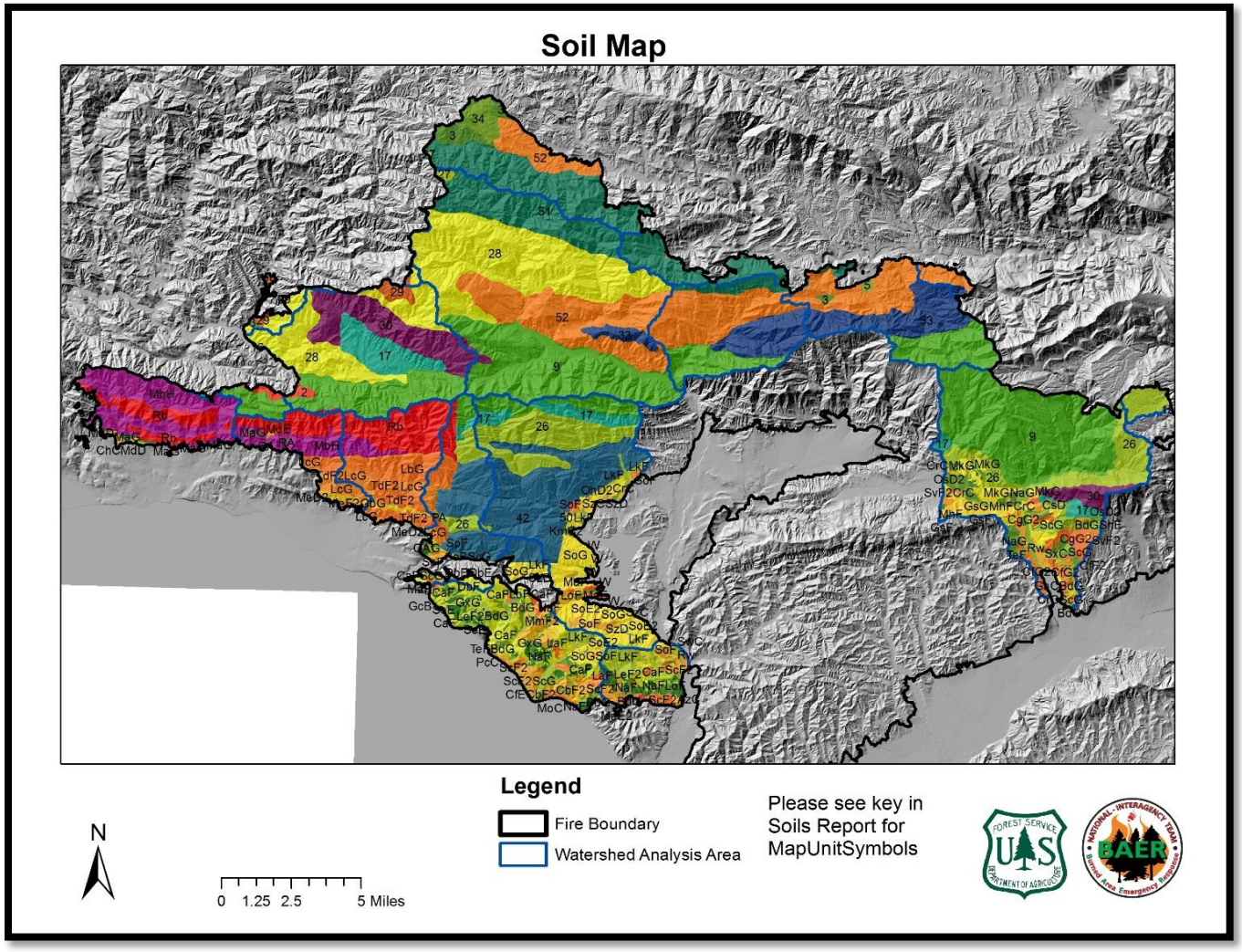
P. Dominant Soils: [abbreviated table or list, including general descriptor, e.g. gravelly sandy loams and loams of XYZ families…] [and by Fire if a Complex, as appropriate]

Inks-Lodo-Agua Dulce families complex, range on average from 30 to 80 percent slopes. They consist of gravelly sandy loam soil texture and covered approximately 30936 acres within the fire perimeter.

Illerton-Reliz-Modjeska families association, range on average from 40 to70 percent slopes. They consist of gravelly sandy loam soil texture and covered approximately 17675 acres within the fire perimeter.

Yorba-Modjeska-Morical families association, range on average from 30 to 60 percent slopes. They consist of a Loam soil texture and covered approximately 17334 acres within the fire perimeter.

Yorba-Millsholm-Stonyford families association, range on average from 30 to 60 percent slopes. They consist of sandy loam soil texture and covered approximately 15348 acres within the fire perimeter (see soils map below).



Q. Geologic Types: The Thomas wildfire area area is underlain entirely by alternating sedimentary Sandstone and Shale rock formations, ranging in age from Cretaceous (83-65 million years ago) to Pliocene (5.3-2.5 million years ago) Epochs, and overlain by Quaternary alluvial and surficial sediments and slide deposits to present age. Invariably, rock formations mapped as sandstone have thinner inter-beds of shale, and formations mapped as shale have relatively thinner inter-beds of sandstone (Dibblee, 1966).

R. Miles of Stream Channels by Order or Class: 38 Miles Perennial, 18 Miles Intermittent, and 13 miles ephemeral

Type of Stream	Perennial	Intermittent	Ephemeral
Stream Miles	128	1,211	903

S. Transportation System:
- Roads: 16 (107 FS and 20 private and county) miles
- Trails: 88.3 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres):

Acres: 18,571 (unb/v.low) 41,316 (low) 117,176 (moderate) 2,651 (high)

Percent: 10% (unb/v.low) 23% (low) 65% (moderate) 1% (high)

Acres of Soil Burn Severity By Ownership					
	Unburned	Low	Moderate	High	Grand Total
Federal	13,286	26,043	94,004	2,241	135,574
Other Gov	272	428	1,413	13	2,125
Private	5,024	14,848	21,768	397	42,038
Grand Total	18,582	41,319	117,184	2,651	179,738
Precent	10%	23%	65%	1%	100%

Interpreting the Soil Burn Severity Map: Fire Intensity vs Soil Burn Severity

Parameters commonly used to define fire intensity or burn severity on vegetation are flame height, rate of spread, fuel loading, thermal potential, canopy consumption or tree mortality. Soil burn severity for BAER analysis considers additional surface and below-ground factors that relate to soil hydrologic function, runoff and erosion potential, and vegetative recovery. Indicators of soil burn severity include degradation of surface structure, loss of soil organic matter, and consumption of fine roots and formation of water repellent layers. Thomas BAER Soil Scientists followed standard soil burn severity mapping methods fully described in the Field Guide for Mapping Soil Burn Severity (http://www.fs.fed.us/rm/pubs/rmrs_gtr243.pdf).

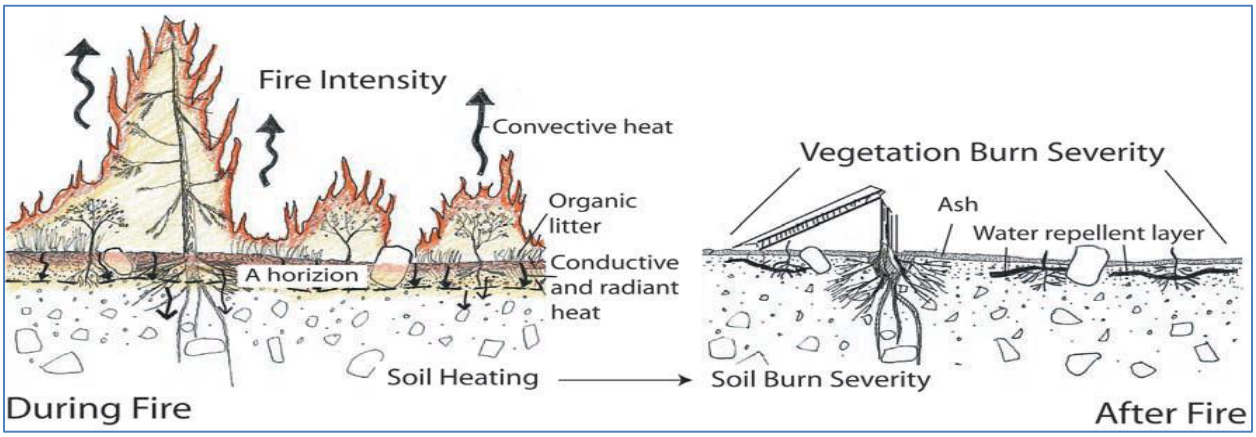


Figure above illustrates the effect of fire intensity on above-ground vegetation and Below ground soil properties (Graphics by Mike Hankinson, National Park Service)

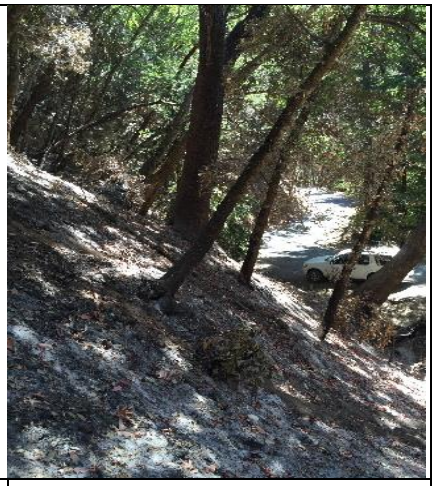
The following soil burn severity map (Figure 1) illustrates the general soil burn severity pattern on the landscape. The soil burn severity is overwhelmingly moderate (65%) with only a very small amount of high (1%). In most of the moderate burn severity, and some of the high burn severity (particularly on south-facing slopes), there is very little vegetation or ground cover remaining except surface rock. There is 23% low soil burn severity because of the high pre-fire ground cover, and partly because the fire was heavily wind-driven and in deep chaparral that has not burned since 1955. Very low soil burn severity was 10% of the fire area (see Appendix B).

The following pictures (Figures 2 & 3) are companion pictures to show typical soil burn severity and landscapes with mixed mortality due to differing vegetation types, slopes, aspect, and location.

Figure 2 – Fire Soil Burn Severity Examples

		
High soil burn severity effects are degradation of surface structure, consumption of soil organic material and formation of water repellent layers	**Moderate soil burn** severity with fire effects of litter and duff removal and char and water repellency to 1 inch below the surface	**Low soil burn severity** due to minimal fire effects on this soil with a clay-loam surface texture

Figure 3 – Landscape examples for soil burn severity

		
High soil burn severity landscape	Moderate soil burn severity landscape	Low soil burn severity landscape

General Soil Burn Severity Patterns, Selected Influencing Factors and Recovery Interpretations (based on field observations)

Selected Factor Influencing Soil Burn Severity: Weather

Weather conditions which influenced fire behavior. For example the fire progression was extreme due to strong winds and heavy brush and flashy fuels and moved west from the Thomas Aquinas College along Santa Paula Fount County to Ojai within a few days of ignition. The fire then moved in a southerly to westward direction, burning over to the headwaters of Montecito.

Selected Factor Influencing Soil Burn Severity: Terrain

Steep terrain and chimney canyons played a role in fire behavior along with wind patterns. South and southwest slopes typically have lower humidity, higher fuel temperatures and are more exposed to summer winds. These areas had more brush and flashy fuels creating rapid fire spread. With these

conditions strong downslope winds ("sundowners") increased burn intensity above the community of Goleta.

Selected Factor Influencing Soil Burn Severity: General Vegetation, Density, and Fire History
Vegetation cover type, density and fuel loading also influenced the soil burn severity patterns especially areas that have burned in the past. Areas inland are not influenced by coastal fog and humidity experienced moderate to high burning on north-facing slopes and on south-facing slopes influenced by "sundowners".

Selected Factor Influencing Soil Burn Severity: Soil Type/Surface Layer Texture
Soil type also influenced soil burn severity patterns. Fire effects on soils such as degradation of structure, changes in soil color, consumption of fine roots and depth of water repellent layers were strongly influenced by soil surface texture. In soils with clay loam surface textures, fire effects on soil were commonly minimal soil destruction and water repellency generally occurred at the surface. In soils with sandy loam and fine-gravelly loam surface textures, fire effects on soil were common soil charring and aggregate destruction to depths of 1 inch up to 4 inches and water repellency was observed at depths of up to 4 inches.

Initial Interpretation for Recovery of Hillslope Stability: Ground Cover
Low rates of leaf litter were observed in forested areas due to full consumption of canopy but with low and moderate soil burn severity some cover was present. Thin layers of scorched needles and leaves do provide effective erosion control in these areas. In forested areas that experienced high soil burn severity or areas where shrub cover was consumed, ground cover recovery will be slow. Recovery of low lying vegetation will heavily influence recovery of hill-slope stability in these areas.

B. Soil Resource Condition Assessment Sections:

The Thomas Fire burned approximately 281,893 acres between Santa Barbara and Ventura, in same-named counties, CA. There was a Phase 1 Burned Area Emergency Response (BAER) Team assessment focused in the Ojai area prior to efforts for Phase 2 assessment documented here. Phase 2 assessment includes mapping soil burn severity (SBS) on the remaining approx. 240,000 acres of the fire, and Values at Risk (VAR) assessment and erosion modeling on approx. 180,000 acres of Forest Service lands and select private lands in coordination with state WERT teams conducting similar assessments on private lands. The BAER Team found the overall soil burn severity to be 10% unburned & very low, 23% low, 65% moderate, and 1.5% high for the entire fire area. The unusual lack of more high is attributed to lack of dense forest ecotypes and the rapidly-moving nature of the fire (short heat residence time upon the soil). Severe soil heating was fairly rare and restricted to steep ridgetop areas, presumably with pre-heating of fuels from fire progression patterns. Vegetation is predominantly chaparral-southern coastal scrub with some watersheds having a mix with grasslands and/or mixed hardwood forest ecotypes, the latter mainly in riparian corridors with more soil moisture availability.

Very little of the mapped high SBS was accessible to confidently characterize fire-wide. Moderate SBS has fairly intact soil structure with presence of most fine roots, albeit charred in the surface 1-3 cm, and the natural seedbank should be only modestly affected boding well for natural recovery in the future. However, soil water repellency was very common within moderate and high SBS, estimated in 40-60% of these areas, and present but spotty in low soil burn severity areas. The moderate SBS areas are estimated to largely have a watershed response similar to a high in terms on runoff production, but should not be quite as erodible given modest storm intensities. Low SBS areas still have good surface structure, contain intact fine roots and organic matter, and should recover in the short-term once revegetation begins and the soil surface regains more cover for erosion protection. VARs upon NFS lands are

invariably linked to rather large areas of moderate SBS upon slopes above; identified VARs are mainly road and trail infrastructure, and a few archaeology sites. There are NO land treatments for conservation of soil productivity proposed; we do have high modeled erosion rates within the assessment areas, but seasonal timing and implementation feasibility are unfavorable for committing such effort and resources toward unknown winter storm scenarios, while in the winter season. Off-site hazards of erosion source areas are present and serious, possibly posing high risks to life and property; ability to manage these risks is very limited because of both challenging topography and timing.

C. Water Repellent Soils:

9,502 acres (30%) low; 58,588 acres (50%) of Mod 1,325.5 acres (60%) High

Hydrophobic strength was observed in approximately 50% of the observed fire area. Soils that burned with moderate and high soil burn severity on south aspect slopes resulted in near complete vegetation canopy and organic horizon removal, leaving surface rock as the only effective ground cover. The other moderate soil burn severity class occurred.

D. Erosion Potential (erosion hazard rating):

Soil texture, climate, slope, rock content and burn severity dictate soil EHR. These ratings are consistent with field observations made during the BAER soil assessment. These observations were calculated from the 2 year and 10-year storms on the burned sediment severity ERMiT map.

		2-Year Event	10-Year Event
Ownership	Acres	Sed. Production	Sed. Production
Federal	135,574	1,797,009	5,238,479
Other Gov/Public*	2,125	25,187	64,049
Private	42,038	463,959	1,237,497
Total	179,738	2,286,154	6,540,025
*Othe gov/public includes city, county, state, and water districts			

E. Sediment Potential:

The Erosion Risk Management Tool (ERMiT), was used to model both pre and post fire sedimentation. In areas with moderate and high burn severity, erosion potential was generally increased above natural conditions. Sedimentation was modeled for the first year post-fire with 2, 5, and 10 year runoff events.

For the total fire area, erosion rates are modeled at 12.7 tons/acre for a single 2-year runoff event, and 36.4 tons/acre for a 10 year event.

Summary of Watershed Response

Erosion Response:

Regardless of the accuracy of absolute numbers, the model is used here for relative rating of different areas within the fire for relative potential as sediment source areas. Matilija Creeks and Juncal Canyon have the highest erosion rates, and 3 of the 4 Sespe sheds have lower erosion rates about half of that. Sometimes we see order of magnitude differences between sheds driven mainly by different SBS ratios; here the dominance of moderate SBS and lack of high is driving a fairly small range of erosion rates.

Table 2 - Modelled Hillslope Erosion for post-fire 2 and 10 year runoff events

		2-Year Runoff Event		10-Year Runoff Event	
		Erosion Rate	Sed. Production	Erosion Rate	Sed. Production
HUC6 Watershed (clipped to fire perimeter)	**Acres**	**(tons/ac)**	**(tons)**	**(tons/ac)**	**(tons)**
Mission Creek-Frontal Santa Barbara Channel	7,478	12.8	95,575	33.9	253,452
Santa Monica Creek-Frontal Santa Barbara Channel	4,767	12.9	61,340	34.8	165,863
Carpinteria Creek	8,121	13.7	111,573	36.6	297,616
Rincon Creek	7,816	11.9	93,219	32.8	256,447
Coyote Creek	21,170	12.1	255,405	32.4	686,754
Los Sauces Creek-Frontal Pacific Ocean	11,035	13.4	147,527	32.2	354,952
Lower Ventura River	3,857	11.0	42,343	25.9	99,865
Gibraltar Reservoir-Santa Ynez River	4	4.8	19	15.1	59
Blue Canyon-Santa Ynez River	1,394	11.5	16,070	37.8	52,699
Agua Caliente Canyon	1,432	12.9	18,542	37.5	53,635
Juncal Canyon-Santa Ynez River	17,221	15.8	271,449	46.5	800,669
Matilija Creek	34,917	14.8	515,496	44.2	1,544,802
North Fork Matilija Creek	10,223	14.5	147,720	44.4	454,327
Abadi Creek-Sespe Creek	9,786	7.1	69,350	20.0	195,734
Tule Creek-Sespe Creek	13,869	12.7	176,610	39.5	548,245
Piedra Blanca Creek-Sespe Creek	904	8.7	7,891	31.5	28,486
West Fork Sespe Creek-Sespe Creek	1,051	7.2	7,528	25.4	26,686
Santa Paula Creek	24,694	10.1	248,498	29.1	719,735
Grand Total	**179,738**	**12.7**	**2,286,154**	**36.4**	**6,540,025**

Most watersheds have erosion rates between 10-15 tons/acre for a 2-year runoff event. These are in the high end of what we would normally consider acceptable with respect to natural recovery versus considering slope treatments to stabilize soils; rates over 20 tons/acre for a 2-year event are more of a concern. Where these occur in this fire are on very steep slopes where stabilization treatments would not be very effective, and thus not cost effective. Treating lower gradient slopes with lower erosion rates

does not generally reduce total sediment production effectively at watershed scale, and thus is not generally cost effective either. Substantial areas in 20-60% slope gradients and high erosion rates are the most cost effective to treat and make a significant difference at watershed scale (see Appendix B for 2-year and 10-year erosion maps).

Hydrology

Watershed resources located within and downstream of the burn areas include springs, perennial, intermittent and ephemeral streams, and reservoirs. The fire lies within 25 HUC 6 level watersheds, see Table 1 for acres and percent moderate and high soil burn severity (SBS). Main waterbodies within and downstream of the burn area include: Lake Casitas, Jameson Reservoir, Gibraltar Reservoir, Matilija Lake, and Lake Cachuma. Main drainage systems include the Santa Ynez River system, Ventura River system, and Santa Clara River system. Multiple smaller drainage systems comprise the coastal watersheds in the Pacific Frontal area. See section M above, which lists HUC 6 watersheds impacted by the fire.

Climate
Elevation across the Thomas Fire ranges from sea level to 6,000 feet. Because of the variability in elevation, aspect, proximity to the coast, and general topography, annual precipitation and pattern is variable across the fire area. The maximum annual precipitation occurs near the headwaters of Matilija and Abadi Creek-Sespe Creek watersheds (~54 inches annually) with lower elevation coastal watershed of Las Sauces only accumulating approximately 16 inches annually.

Major flooding events have occurred in the Santa Ynez Mountains when a weather system dubbed the “Pineapple Express" taps into subtropical moisture from the latitudes of the Hawaiian islands. These warm and long duration storm events can cause major deluges and torrential rains leading to flooding. January 2017 had significant rainfall from such an occurrence that resulted in flood damage across Los Padres NF lands in the Santa Ynez Mountains.

Fire Impacts on Hydrologic Function
Functioning of hydrologic processes is connected to vegetation (type, density, litter and organic matter accumulation) and soil types. Fire causes impacts to several hydrologic processes including reduction in interception, transpiration, and infiltration, and increases in the rate of runoff (due to lack of litter and decreased surface roughness) and soil moisture. Removal of vegetation and changes to soil such as increases in hydrophobicity, changes in soil structure, and removal of duff and organic matter alters these processes and ultimately lead to increases in runoff, peak flows and erosion. Changes in hydrologic processes can also lead to slope instability and result in post-fire debris flows, mudflows, and other mass wasting (as described in the geology report)

Wildfires primarily affect water quality through increased sedimentation. As a result, the primary water quality constituents or characteristics affected by this fire include color, sediment, settleable material, suspended material, and turbidity. Floods and debris flows can entrain large material, which can physically damage infrastructure associated with the beneficial utilization of water (e.g., water conveyance structures; hydropower structures; transportation networks). The loss of riparian shading and the sedimentation of channels by floods and debris flows may increase stream temperature. Fire-induced increases in mass wasting along with extensive tree mortality can result in increases in floating material – primarily in the form of large woody debris. Post-fire delivery of organic debris to stream channels can potentially decrease dissolved oxygen concentrations in streams. Fire-derived ash inputs can increase pH, alkalinity, conductivity, and nutrient flux (e.g. ammonium, nitrate, phosphate, and

potassium), although these changes are generally short lived. Post-fire increases in runoff and sedimentation within the urban interface, and burned structures and equipment within the fire perimeter may also lead to increases in chemical constituents, oil/grease, and pesticides.

The most noticeable effects on water quality will be increases in sediment and ash from the burned area into waterbodies in and downstream of the fire area. Flash flooding and debris flows are natural watershed response for this area. The risk of flash flooding and erosional events will increase as a result of the fire, creating hazardous conditions within and downstream of the burned area.

Flooding Potential and Modeling

Soil burn severity has a very strong influence on flooding potential. High severity to moderate severity burned soils tend to have more water repellency post fire; however, a certain amount of water repellency is natural in pre-fire conditions as well. The increase in fire-related water repellency diminishes with lower burn severity. Field observations indicated that about 50% of the soils within the burn area exhibited hydrophobicity. Flood potential will decrease as vegetation reestablishes, providing ground cover, increasing surface roughness, and stabilizing and improving the infiltration capacity of soils.

Hydrologic Modeling

Modeling for post-fire flooding was conducted on selected pour points that were associated with specific VARs and/or that might be representative of watershed response in a general area. Pour points are points on the landscape through which all water upslope of the point passes through. See watershed report for pour point locations and detailed analysis. The model designed by Rowe, Countryman, and Storey (RCS), 1949, was used to estimate post-fire increases in peak flows. Kinoshita, Hogue, and Napper, 2014 validated continued use and applicability of this model for Southern California. The model designed by RCS provides data for pre- and post-fire discharges and erosion rates in southern California watersheds. Individual rates for various subwatersheds were developed over long observation periods.

The analysis for pre- and post- fire hydrologic response and probability of flows is based on the probability of a 2-year 24 hour storm occurring in the fire area (RCS, 1949). The 2-year design storm has a 50% chance of occurring in any given year, and a 97% chance of occurring in the next five years. The 2 year, 24 hour duration storm for these subwatersheds ranges from 5.5-7.0 inches across the burn based on NOAA precipitation tables (NOAA, 2014). However, although the RCS model is based on the 24 hour duration storm, the storm expected to occur within the fire burned area that could produce damaging post-fire effects is a short duration, high intensity storm. Intensity within a storm and antecedent soil moisture are both spatially variable. Ultimately, when precipitation intensity is greater than infiltration rates or exceeds infiltration capacity, runoff initiates and erosion potential increases.

Overall, the primary watershed responses of the Thomas Fire are expected to include: 1) an initial flush of ash, 2) rill, gully, and mass wasting erosion in drainages and on steep slopes within the burned area, and 3) floods with increased peak flows and sediment deposition. The modeling results estimate significant increases in flow in most watersheds (as much as 2-3x normal flows). 2 year recurrence interval (RI) peak flows may resemble Q8-Q15 RI peak flows. 10 year RI peak flows may resemble Q30-Q85 RI peak flows. See tables in the watershed report for pre and post-fire flows at selected pour points.

Post-fire flows will be bulked with sediment and woody debris increasing the volume of runoff, which could negatively impact culverts, bridges, constructed channel ways, and other infrastructure designed to pass “normal” flows. Bulking and increased flows may cause channels to flood/divert to areas that do not usually flood. Following the 2003 Cedar Fire on the Cleveland National Forest, non-bulked results calculated using Rowe, Countryman and Storey were compared to a modified rational equation model which considered bulked flow using the U.S. Army Corps of Engineers Los Angeles district method for prediction of debris yield (2000). This comparison found that predicted bulked flows were 2.14 times

larger than unbulked flows. Other studies have indicated a bulking factor of 2.5 for flows is appropriate (personal communication, WERT). A bulking factor was not included in the modeled Q listed in the assessment tables. Channel crossings, depositional fans, and floodplains have an inherent risk of flooding. Post fire modeling results are most applicable during the first year of recovery; hydrologic response will decrease in subsequent years.

Debris Flow Potential:

Within the Thomas Fire burned area, slope failures such as rock fall, debris slides, debris flows, dry ravel, surface erosion and gullying have shaped the landscape in the past. Those processes will now be exacerbated, relative to the degree of fire burn severity, and the intensity, frequency and duration of future storms. In watersheds that experienced moderate to high soil burn severity which caused the removal of vegetation by the fire, soils are exposed and have become weakened and rocks on slopes have lost their supporting vegetation. Due to these post-fire new conditions, threats are elevated from rockfall, debris slides, flooding and sediment deposition, and in some cases, debris flows. Risks to living beings, property and infrastructure, roads, trails, campgrounds, reservoirs and natural resources is moderate to high in some areas of the Thomas Fire.

The US Geological Survey (USGS) - Landslide Hazards Program, has developed empirical models for forecasting the probability and the likely volume of post-fire debris flow events. To run their models, the USGS uses geospatial data related to basin morphometry, burn severity, soil properties, and rainfall characteristics to estimate the probability and volume of debris flows that may occur in response to a design storm (Staley, 2016). Estimates of probability, volume, and combined hazard are based upon a design storm with a peak 15-minute rainfall intensity of 12 – 40 millimeters per hour (mm/h) rate, equal to 0.47 – 1.57 inches per hour rate. We selected a design storm of a peak 15-minute rainfall intensity of 28 millimeters per hour (mm/h) rate (equal to 1.1 inch/hr rate) to evaluate debris flow potential and volumes since this magnitude of storm seems likely to occur in any given year.

Based on USGS debris flow modeling it appears that under conditions of a peak 15-minute rainfall intensity storm of 28 millimeters per hour (1.1 inch/hr.), the probability of debris flows occurring is 80-100% in the majority of the main channel/creeks in the burn area. Under these same conditions, predicted volumes of these debris flows are expected to range from 10K-100K cubic meters in these same channels. From the debris flow combined hazard map it appears that the majority of creeks in the burn area are predicted to produce debris flows of a high combine hazard (see Appendix B for map).

PART IV - HYDROLOGIC DESIGN FACTORS

Table 3. Hydrologic design factors

A	Estimated Vegetative Recovery Period	3-5 years	3-5 years
B	Design Chance of Success	--%	--%
C	Equivalent Design Recurrence Interval	2 years	10 years
D	Design Storm Duration	24 hour	24 hour
E	Design Storm Magnitude	5.5-7.0 inches	8.4-11.2 inches
F	Design Flow	50 cfs/mi^2	121 cfs/mi^2
G	Estimated Reduction in Infiltration	50%	50%

H	Adjusted Design Flow	124 cfs/mi^2	239 cfs/mi^2

PART V - SUMMARY OF ANALYSIS

A. Describe Critical Values/Resources and Threats:

Background:
The fire broke out December 4th near Thomas Aquinas College in Ojai. The fire was fanned by strong Santa Ana winds overnight, and quickly spread into the city of Ventura. More than 800 structures in Ventura County were destroyed. The fire crossed into Los Padres National Forest and burned in the Santa Barbara and Ojai Ranger Districts. Los Padres NF worked Unified Command with Cal Fire and other local cooperating agencies. Approximately 61% of the fire is on federal lands. 181,333 acres are on National Forest System Lands. A Forest Closure Order prohibits public access in the Santa Barbara, Ojai and Mt. Pinos Ranger Districts. The fire is now the largest fire in California's history at 281,893 acres.

Summary of Thomas Fire BAER Values at Risk
Based on field observations and assessment of burned watershed conditions and expected responses the BAER team identified potential for post wildfire impacts on the following BAER values at risk:

Human Life and Safety
- Increased risk for the general public to be impacted by rolling rocks, flooding, landslides, debris flows and hazardous trees along road and trails

Property
- USFS system roads
- USFS trails
- USFS campgrounds
- Water diversion and conveyance infrastructure

Natural Resources
- Water for domestic and agricultural uses
- Native or naturalized plant communities
- Soil productivity and hydrologic function
- Fisheries and Aquatics
- Wildlife

Cultural Resources
- Prehistoric sites
- Historic sites

Risk Assessment Process:
The risk matrix below, Exhibit 2 of Interim Directive No.: **2520-2010-1** was used to evaluate the Risk Level for each value identified during Assessment:

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely	Very High	Very High	Low
Likely	Very High	High	Low
Possible	High	Intermediate	Low
Unlikely	Intermediate	Low	Very Low

Values at Risk Matrix:
The values at risk (VAR) matrix displayed in Appendix C below summarizes values at risk, post wildfire threats and risk ratings for forest service lands. Other lands that are not forest service (BOR, State, County, and Private) were noted but not evaluated for risk. Values with high or very high risk ratings are addressed, where possible, with BAER response actions (treatments). Generally, response actions are not recommended for values with low and intermediate risk ratings (except in the case for life).

Life and Safety Values at Risk - Forest Users and Personnel: The BAER team identified increased risk for potential impacts to life and/or safety of Forest visitors and personnel entering the burned area. Potential threats include rolling rocks, flooding, debris flows and/or landslides, sediment or debris delivery to hazardous trees, loss of road or trail tread, and loss of ingress/egress. Generally, increased risk occurs within or directly down-slope from high and moderate burn severity areas. The proposed installation of warning signs outreach efforts to share key information from the BAER report will also lower the probability that life and/or safety could be impacted by post wildfire processes.

Private Property (Property and Life Safety) - Private Homes and Structures: The BAER team did identify some private residences and structures at increased risk from post wildfire processes. However, extensive inventory of structures and other values on private land was not conducted. Information sharing and outreach efforts with NRCS and Santa Barbara and Ventura County departments of transportation and emergency services focusing on potentially affected communities are proposed to increase awareness of burned area conditions and potential impacts to private values.

Property Values at Risk - Forest Service Roads
The following values as related to National Forest roads were identified during the Thomas Fire BAER assessment.

Human Life and Safety:

High Risk (Possible, Major) – It is likely that storms would provide increased runoff and sediment delivery to various roads within the Thomas Fire due to the moderate to high burn severity in the area. If not mitigated, runoff and sediment delivery to the road prism would cause a safety issue to road users and increase the chance of injury. In the Thomas Fire, National Forest System Road (NFSR) 4N05 (Chismahoo/Superior), 4N10 (Laguna Ridge), 4N15 (Sisar Canyon), 5N12 (East Camino), 5N13 (Matilija/Murietta), 5N42 (Chief Peak), 5N08 (Nordhoff Ridge), and 6N01 (Cherry Canyon) are mainly the

roads within the Thomas Fire where there is a risk to life and safety of public, FS personnel, permittees, and other road users.

Property:

High Risk (Likely, Moderate) – Property damage to National Forest Service Roads are at high risk from water diversion and loss of road function and access on NFSR 4N05 (Chismahoo/Superior), 5N12 (East Camino), 5N13 (Matilija/Murietta), 5N15 (Romero Camuesa), and 5N16 (Big Caliente). Protection of the culverts and over side drains is necessary to handle the increased runoff and sediment delivery. If not mitigated, the drainage features would not function as intended and caused damage to the road prism. Potential washouts could occur on road segments where there is a lack of drainage structure.

Risk Assessment – Forest Service roads

- Probability of Damage or Loss: Likely. This determination is based on the expectation that increased erosion and sediment will occur and could plug drainage structures along roads.
- Magnitude of Consequence: Moderate. This determination was made based on the amount of damage that would occur if culverts were temporarily plugged.
- Risk Level: High

Property Values at Risk - Forest Service Trails

As described in the BAER recreation, hydrology, and geology reports there is potential for damage to occur on trails within the fire perimeter. In addition to impacts to Forest Service trails, this report also describes increased risk for the safety of trail users.

Potential impacts to trails include erosion of trail tread, damage to trail drainage features, sediment or debris deposition on trails and impacts to trail crossings. For complete details see recreation report in project folder.

The property values at risk are segments of Forest Service system trails. In areas of high soil burn severity mid-slope trails are likely to become covered by dry ravel and debris. It is also likely that there will be moderate trail damage caused by the loss of water control. In addition, fire-damaged trees will fall across the trail. This added material will also obscure trail definition, causing users to wander off the established trail, especially at switchbacks. Repeated off-trail travel may eventually create a new path that is hazardous to users and subject to enhanced erosion.

Some system trail segments have been found to be at high risk of damage and/or loss. These findings are based on proximity to moderate and high burn severity areas, side hill slope, soil characteristics, and results of aerial and on-the-ground surveys.

Probability of Damage or Loss: Likely
Magnitude of Consequence: Moderate
Risk Level: High

Water Quality:

The following BAER critical values (Forest Service Manual 2523.1 Exhibit 01) were considered as potential values at risk from post-fire flows and debris.

- Hydrologic function on National Forest System (NFS) lands.
- Water Quality on NFS lands.
- Human life and safety on NFS lands

Impacts to Domestic water users
Numerous small water systems are scattered throughout the Thomas Fire area. The majority of these water systems are associated with private property and are located on mid to lower slope drainages. Burn severity mapping indicates that these systems may have been impacted by the high severity fire. Systems that take water from streams in burned watershed will likely experience issues with turbidity and potential damage to system infrastructure during fall and winter storms. Systems that take water from springs will have a higher potential for impacts.

Treatments: Share assessment information with water users and NRCS. Municipal Water district possible actions: Increase maintenance at water intake facilities. Monitor system during storm events. Consider adding storage to ensure a clean water sources during high turbidity events.

Natural Resource Values at Risk – Water Quality
Surface waters in the fire area will be bulked by ash, debris, and other floatable and transportable material during storm events. It is likely that stream flows from the first post-fire runoff producing rain events will see high concentrations of ash and fine sediment that will cause considerable turbidity and degradation of water quality and the beneficial uses of water. Beneficial uses of water are identified and protected by the California State Water Quality Control Board by regulation as found in the Santa Ynez River Basin Plan. Beneficial uses are: municipal water supply, contact and non-contact recreation, wildlife habitat, warm and cold water aquatic habitat, rare species habitat, fresh water replenishment, and spawning.

It was recognized that there are values potentially at risk to flooding and/or debris flows on other jurisdictional lands within and adjacent to the burned NFS lands. The authority to assess and mitigate emergencies for these other jurisdictional lands lies with the National Resource Conservation Service (NRCS). Some areas of potential risk include;

- Lake Cachuma and the associated Gibraltar Reservoir, Jameson Reservoir, and Casitas Reservoir and water intake facilities.
- Private lands and resources (including residences, buildings, roads, bridges, culverts, ranches, camps, resorts, other structures, etc.) throughout the forest.
- Hwy 192 stream crossing culverts and bridges under the jurisdiction of the county of Santa Barbara.

Coordination between the US Forest Service and other jurisdictional entities (primarily NRCS) will be essential to continue risk assessment to these other properties.

Water Quality

- The most noticeable effects on water quality will be increased sediment and ash from the burned area into Jameson and Casitas reservoirs, although this may largely depend on volume at the time of runoff events.

Treatment: Share assessment information with private landowners and BOR, and NRCS. Increased post-fire flood flows may overwhelm existing NFS and private road crossing structures, causing washouts,

and stream diversion down the road. This can result in a threat to public safety, damage to infrastructure, and increased sediment delivery to downstream channels.

- Magnitude of Consequences: Moderate
- Probability of Damage or Loss: Likely
- Risk: Intermediate

- Storm patrols should be conducted by all relevant parties to ensure that blockage of crossing structures do not occur during the first runoff producing storms. Roads should be storm-proofed as necessary.
- Share assessment information with local communities, landowners, water users, permit holders, NRCS, and NOAA/NWS to facilitate preparation for fall and winter storm.

Natural Resource Values at Risk - Soil Productivity

Soil productivity on steeper slopes could be compromised in the areas that have burned at high and moderate soil burn severity. Portions of Montecito, Carpentaria, Matilija headwaters are at risk based on a lack of soil cover, deep soil charring, and steep slopes that could erode productive topsoil. For complete details see soils report.

Natural Resource Values at Risk - Threatened and Endangered, Sensitive, and Invasive Plants

The Thomas Fire burned within the Los Padres NF on the Ojai and Santa Barbara Ranger Districts of the Los Padres Nation Forest. The fire started December 4, 2017, is still not completely contained or controlled, and affected 281,893 acres of which, 152,000 acres were on National Forest System (NFS) lands. Many of the dozer lines used in previous fires were reopened for the Thomas Fire. A reopening of the dozer lines for the Thomas Fire has further increased the risk for invasive plants to establish because the native vegetation has not been allowed to reestablish. In addition, Forest Service Sensitive plants along dozer lines were directly affected and are now even more susceptible to competition from invasive non-native plants.

Many non-native plants are found in California wildlands, but some are much more invasive and noxious than others. Noxious weeds have spiny or sharp parts which can be hazardous or annoying to humans and livestock. Invasive weeds are very effective at occupying disturbed soil and displacing native plants and habitat. Non-native invasive weeds have the potential to displace native vegetation, degrade habitat function, and lower ecosystem stability. Ecological stability relates to the value of native plant communities for wildlife habitat and watershed function.

The potential values at risk, in relation to invasive noxious weeds are the ecological stability of native plant communities and the degradation of Region 5 Sensitive plant habitat. The Thomas Fire impacted a variety of different plant communities and environments. The major plant communities found within the fire area are:

- Coastal Sage Scrub
- Chaparral
- Oak Woodland
- Riparian Woodland
- Pinyon woodland
- Bigcone Douglas-Fir

The R5 Sensitive Plants with potential to be affected by noxious weeds are:

- Abram's flowery puncturebract (*Acanthoscyphus parishii* var. *abramsii*)
- Late-flowering mariposa lily (*Calochortus fimbriatus*)
- Palmer's mariposa lily (*Calochortus palmeri* var. *palmeri*)
- Umbrella larkspur (*Delphinium umbraculorum*)
- Pale-yellow layia (*Layia heterotricha*)
- Santa Barbara honeysuckle (*Lonicera subspicata var. denudata*)
- Flax-like monardella (*Monardella linoides* ssp. *oblonga*)
- Chaparral beargrass (*Nolina cismontana*)
- Nuttal's scrub oak (*Quercus dumosa*)
- Sonoran maiden fern (*Thelypteris puberula var. sonorensis*)
- Santa Ynez false lupine (*Thermopsis macrophylla*)
- Ojai fritillary (*Fritillaria ojaiensis*)

The Natural character of the Dick Smith, Matilija, and Sespe Wilderness Areas can be effected by the invasion of noxious weeds. Dozer lines were constructed adjacent to or near each of these wilderness areas and can serve as sources of noxious weed invasions.

Threats to Forest Sensitive Species**:**

Probability of Damage or Loss: Likely
Magnitude of Consequences: Moderate
Risk Level: High

Natural Resource Values at Risk - Threatened and Endangered, Sensitive Wildlife

This assessment evaluates the effects of the Thomas Fire and the potential effects of the burned area emergency response (BAER) treatments on the following federally-listed fish and wildlife species and critical habitats:

California condor (*Gymnogyps californicus*)
Least Bell's vireo (*Vireo bellii pusillus*) designated critical habitat.
Arroyo toad (*Anaxyrus californicus*) and designated critical habitat for arroyo toad.
California red-legged frog (*Rana draytonii*) and designated critical habitat for California red-legged frog

California condor: Cases of entrapment are rare, as avian wildlife are better adapted to avoiding the impacts of wildfires than terrestrial fauna. While condors and other scavengers (turkey vultures and ravens) are known to forage over burned areas and benefit from available food resources killed in the fire, condors are currently not utilizing foraging habitat in the front range of the Santa Ynez Mountains. Several illegal shooting sites on the west side of Cherry Creek Road represent a micro-trash risk to the species. The risk of micro-trash being ingested is considered a feasible post-fire effect based on proximity to current condor GPS telemetry flight lines from the Sespe Wilderness to Bitter Creek National Wildlife Refuge to the northwest. The potential for impacts is a driving factor in the species risk assessment.

Probability of Damage or Loss: **Possible**
Magnitude of Consequence: **Major**
Overall Risk: **High**

Least Bell's vireo and their critical habitat: At the time that the Thomas Fire occurred, breeding activity for migratory birds had been concluded, and both adults and fledged young of the year had departed for wintering locations. The Thomas Fire did directly impact some least
Bell's vireo critical habitat along the Santa Ynez River (1144 acres) which was burned during the fire. An additional 566 acres along the Santa Ynez River is expected to be altered by post-fire effects, due to flooding and debris flows. While critical habitat along the Santa Ynez River may be detrimentally affected by the fire in the short term, this habitat has not experienced a major disturbance since the Coyote Fire in 1964, and parts of it have become decadent. In order to provide suitable habitat for an early to-mid-successional species such as LBVI, riparian corridors need to be periodically re-disturbed, which historically has occurred due to fires and alluvial flooding events.

Probability of Damage or Loss: **Likely**
Magnitude of Consequence: **Minor**
Overall Risk: **Low**

Arroyo toad and critical habitat: Arroyo toads and their critical habitat evolved under environmental circumstances in which they are dependent upon frequent re-disturbance by flood/ wildfire to create or reset local habitat conditions. While wildfires and post-fire effects (flooding, debris flows and sedimentation) likely have detrimental short-term effects on both the species and existing patches of suitable habitat, arroyo toads are known to recover quickly after disturbances due to high fecundity under favorable environmental conditions. Further, the formation of patches of suitable habitat (within their critical habitat) is dependent upon sedimentation events after disturbance to distribute sandy substrates which form favorable breeding, foraging and estivation sites. Of the 4 populations identified as values at risk…

Probability of Damage or Loss: **Likely**
Magnitude of Consequence: **Moderate**
Overall Risk: **High**

California red-legged frog and critical habitat: California red-legged frogs and their critical habitat are known to be negatively impacted by the direct and indirect impacts associated with wildfire incidents. Wildfires with a significant proportion of moderate to high burn severity generally result in sediment deposition within riparian habitats, which detrimentally alters the PCEs for CRLF habitat. Of the 8 populations identified as values at risk, 5 populations are either expected to be either extirpated or potentially extirpated, with severe short-term habitat degradation. The other 3 populations are expected to experience loss of individuals, coupled with minor to major short-term habitat degradation. The resulting cumulative impact to the species, from recent post-fire effects is considered a serious conservation threat on the Los Padres NF.

Probability of Damage or Loss: **Very Likely**
Magnitude of Consequence: **Major**
Overall Risk: **Very High**

Natural Resource Values at Risk - Threatened and Endangered Fisheries

Of the 21 steelhead critical habitat streams described above as being at risk from impacts due to the Thomas Fire, the overall risk is very high for water quality concerns and loss of federally endangered Southern California steelhead populations and designated critical habitat (Table 4). The majority of subwatersheds are subject to increased probability of flooding and debris flows resulting in excess sediment delivery to these drainages. For aquatic species, post-fire impacts will include compromised water quality and changes in water chemistry due to ash delivery and inputs of ammonium, nitrate,

phosphate, potassium and increased alkalinity, increased solar radiation and water temperature due to reduced riparian cover, increased sedimentation, loss of woody debris and complex substrates, scouring of riparian/aquatic vegetation, and changes in streambed/pool habitat due to geomorphic movement (debris flows), and impacts to fish including extirpation. These combined impacts may lead to a long term loss or reduction of suitable stream habitat in several Santa Barbara and Carpinteria Front Country streams, North Fork Matilija Creek, Lion Canyon Creek, Rose Valley Creek, Howard Creek and Ladybug Creek for steelhead. There is concern that recovery will not take place until fine sediments move through these systems, and pool-riffle-run sequences are recreated through the return of complex substrates, and sufficient riparian cover to reduce water temperatures and provide sufficient allochthonous (leaf) input for fish prey (e.g., shredders and detritivores) including the return of a complex food web. Further, steelhead populations that are isolated from a proximate source population of conspecific fish (metapopulation of *O. mykiss*) will be slower to recover than those that maintain steelhead in adjacent drainages within the same watershed.

Summary:

Emergency Determination
Based on the above assessment, it is my determination that an emergency does exist for federally endangered Southern California steelhead and designated critical habitat and water quality in all 21 streams designated as critical habitat for SCS. Specific treatments that maintain stream migration corridors and improve chances for anadromy will alleviate restrictions or blockages that result in freshwater residency, exclusively. These steps include monitoring culverts and underpasses and potentially relocating fish to nearby stream systems by agencies authorized with this authority (i.e., NOAA, CDFW).

Soil Productivity Values at Risk

Threats to Soil Productivity**:**

Probability of Damage or Loss: Likely
Magnitude of Consequences: Moderate
Risk Level: High

An elevated level of erosion can be expected in the aftermath of the fire based on modeling of erosion and sedimentation and erosion risk analysis. However, this is a fire-adapted ecosystem that has evolved in the presence of fire, and many of the slopes with the highest predicted erosion are too steep to effectively treat with mulch. Of the ground that is treatable, not enough acres were present on the forest to make any significant reduction in erosion.

The Thomas Fire BAER team assessed the landscape for the effectiveness of potential land treatments; specifically soil cover additions by methods such as straw mulching, wood straw or hydro-mulching. To consider the maximum benefit of treatments, both private and public land were considered. Our analysis showed the percentage of each pour point watershed that could be treated following the feasibility analysis. It is generally considered to treat watersheds if at least 50% of the watershed can be treated. The greatest area of a watershed that could be treated is the Jameson reservoir watersheds.

Property Values at Risk - Heritage Sites

The objective of this report is to identify cultural resource sites considered threatened by deteriorated post-fire conditions, and make treatment recommendations that will reduce damage to site integrity and

significance caused by increased runoff, erosion, and debris flows resulting from effects of damaging events (i.e., storms) on the deteriorated watershed.

This cultural resources assessment centers on post-fire conditions that could directly or indirectly result in adverse effects to known cultural resource sites. Adverse effects may include the potential to bury surface and subsurface cultural resources to prohibit discovery; the possibility of soil movement that would change the context of the remains which are vital to any scientific analysis or interpretation value; and increasing the visibility of site locations that would make them more susceptible to looting or vandalism.

When the BAER Risk Matrix (see Table 1) is applied to cultural resources situated in moderate to severe post-fire conditions within the Thomas Fire, the Probability of Damage or Loss is Likely whereas the Magnitude of Consequences is Moderate, resulting in a High risk to cultural resource sites.

Below is a table (Table 2) of known cultural resources within the burn area of the Thomas Fire. Targeted resources for BAER treatment are identified within the table and specifically described in section D, Treatments to Mitigate the Emergency.

Table 2. Known cultural sites within the burn perimeter

Site Type	Description	Burn Severity	Anticipated Post Fire Effect	Proposed Treatment
P	Chumash Village	No Data	Flooding/Debris	May be off Forest
H	Chumash Camp	Mod to High	Flooding/Debris	No Treatment
P	BRM, Rock Ring, Artifacts	Moderate	Flooding/Debris	No Treatment
P	Chumash Camp	Moderate	Flooding/Debris	No Treatment
H	Graves with Markers	Low	Debris/Flood/Erosion	No Treatment
MC	Artifacts, Features	Low	Erosion	No Treatment
P	Features, Artifacts, Midden	Mod to High	Debris/Mud/Erosion	Private Inholding
P	Rockshelters w/ Rock Art	Low	Flooding/Debris	No Treatment
P	Rockshelters w/ Rock Art	Low	Unknown	No Treatment

Table 2. Known cultural sites within the burn perimeter Continued…

Site Type	Description	Burn Severity	Anticipated Post Fire Effect	Proposed Treatment
P	Dense Lithic Scatter	Low	Unknown	No Treatment
P	Rockshelter with Artifacts	High	Probably Not at Risk	No Treatment
Unkn	No Site Form	Moderate	Unknown	No Treatment
P	Village Site, Groundstone	Low	Unknown	No Treatment
P	Lithic Scatter	Low to Mod	Flooding/Debris	No Treatment
P	Lithic Scatter	Unburned	Unknown	No Treatment
P	Stone Bowl	Unburned	Not at Risk	No Treatment
P	Lithic Scatter	Moderate	Exposure and Erosion	No Treatment
P	Shell Midden with Artifacts	Moderate	Flooding/Debris	No Treatment

P	Rock Rings	Moderate	Flooding/Debris	No Treatment
P	Artifact Concentrations	Moderate	Flooding/Debris	No Treatment
P	Shell Midden	Low	Flooding/Debris	No Treatment
P	Sandstone Pestle	Unburned	Not at Risk	No Treatment
P	Rockshelter w/ Rock Art	Moderate	Not at Risk	No Treatment
P	Rockshelster	Moderate	Not at Risk	No Treatment
P	Bedrock Mortar	Moderate	Not at Risk	No Treatment
P	Shell Midden with Artifacts	Moderate	Debris/Flood/Erosion	Wattles/ Blanket
P	Shell Midden with Artifacts	Low	Debris/Flood/Erosion	No Treatment
P	Lithic Scatter	Unburned	Debris/Flood/Erosion	No Treatment
P	Midden Site	Unburned	Debris/Mud/Flooding	No Treatment
H	CCC Camp w/ Foundations	Unburned	Debris/Mud/Flooding	No Treatment
P	Shell Midden	Low	Debris/Mud/Flooding	No Treatment
P	Lithic Scatter	None to Low	Debris/Mud/Flooding	No Treatment
P	Shell Midden with Artifacts	Unburned	Debris/Mud/Flooding	Outside Burn
P	Stone Bowls and GS	Low	Debris/Mud/Flooding	No Treatment
P	Lithic and Groundstone	Low	Debris/Mud/Flooding	No Treatment
P	Lithic Scatter	Unburned	Debris/Mud/Flooding	No Treatment
P	Lithic Scatter	Moderate	Debris/Mud/Flooding	Private- No Treatment
P	Rockshelter w/ Rock Art	Unburned	Not at Risk	No Treatment
P	Lg Cupule Rock	Low	Possible Debris	No Treatment
H	Cabin Site (burned)	Moderate	Erosion, Debri	No Treatment
P	Bedrock Mortars	Moderate	Debris/Boulders	No Treatment
P	Lithic Scatter	Moderate	Not at Risk	No Treatment
P	Artifacts, Features	Moderate	Debris Possible	No Treatment
P	Lithic Scatter	Moderate	Debri/Mud/Flooding	No Treatment
P	Lithic Scatter	Moderate	Not at Risk	No Treatment
P	Processing Site	Moderate	Increased Erosion	No Treatment
P	Lithic/ Ground Stone	Moderate	Not at Risk	No Treatment

Table 2. Known cultural sites within the burn perimeter Continued…

Site Type	Description	Burn Severity	Anticipated Post Fire Effect	Proposed Treatment
P	Lithic/ Ground Stone	Moderate	Not at Risk	No Treatment
P	Lithic/ Ground Stone	Moderate	Not at Risk	No Treatment
P	Lithic/ Ground Stone	Moderate	Erosion/Boulders	No Treatment
P	Bedrock Mortars	Moderate	Not at Risk	No Treatment
P	Lithic/ Ground Stone	Moderate	Not at Risk	No Treatment
P	Lithic Scatter	Moderate	Not at Risk	No Treatment Recommended
P	Lithic/ Ground Stone	Moderate	Erosion	No Treatment
P	Lithic/ Ground Stone	Moderate	Unknown	No Treatment

P	Lithic Scatter	Moderate	Erosion	No Treatment
P	Lithic Scatter	Moderate	Erosion/Mud/Debris	No Treatment
P	Hearth	Moderate	Erosion	Water Bar
P	Lithics, BRM	Mod to High	Exposure and Erosion	Close/Divert Foot Traffic
H	Artifact Concentration	Mod to High	Exposure and Erosion	Private- No Treatment
H	Homestead	Moderate	Unknown	No Treatment
P	Lithics and Hopper Mortar	Unburned	Unknown	No Treatment
H	Guard Station w/ Barn/Garage	Unburned	Low Risk	No Treatment
P	6500 BP Shell Lens	Moderate	Debris/Flood/Erosion	No Treatment
P	Midden and Burials	Low	Flooding/Debris	No Treatment
H	Site of Ortega Home/Lodge	Moderate	Unknown	Private- No Treatment
P	Rockshelter	Moderate	Flooding/Debris	Close and Monitor
H	Adobe	None to Low	Unknown	No Treatment
P	No Site Form	Unburned	Not at Risk	No Treatment
P	Site	Low	Flooding/Debris	Off Forest
H	Homestead 1880-1914	Low	Flooding/Debris	No Treatment
H	Ranch 1915-1945	Moderate	Flooding/Debris	Private- No Treatment
P	Rockshelter/Rock Art	Moderate	Flooding/Debris	Private- No Treatment
P	Lithic Concentration	Low	Flooding/Debris	No Treatment
P	Two Sites Same No.	Moderate	Exposure and Erosion	Private- No Treatment
P	Shell Midden with Artifacts	Moderate	Exposure and Erosion	Private- No Treatment
P	Midden/Burial	Low to Mod	Flooding/Debris	Close & Erosion Control
P	Bedrock Mortars & Camp	Low to Mod	Flooding/Debris	Close and Wattles
P	Bedrock Mortars/Artifacts	Low	Slide & Debris	No Treatment
P	Rockshelter with Hearth	Low	Unknown	No Treatment
P	Lithic Scatter	Unburned	Unknown	No Treatment
P	Artifact Concentration	Moderate	Unknown	Private- No Treatment

Table 2. Known cultural sites within the burn perimeter Continued…

Site Type	Description	Burn Severity	Anticipated Post Fire Effect	Proposed Treatment
P	Rockshelter with Rock Art	Low	Unknown	No Treatment
P	Lithic Scatter	Low	Unknown	No Treatment
P	Lithic and Groundstone	Unburned	Unknown	No Treatment
P	Lithic and Groundstone	Unburned	Unknown	No Treatment
P	Lithic and Groundstone	Unburned	Unknown	No Treatment
P	Lithic and Groundstone	Unburned	Unknown	No Treatment
P	Lithic Scatter	Unburned	Unknown	No Treatment
P	Lithic and Groundstone	Unburned	Unknown	No Treatment
P	Lithic Scatter	Unburned	Unknown	No Treatment

P	Lithic Scatter	Low	Unknown	No Treatment
P	Lithic Scatter	Low	Unknown	No Treatment
P	Lithic Scatter	Low	Unknown	No Treatment
P	Lithic Scatter	Unburned	Unknown	No Treatment
P	Lithic Scatter w/ Bone	Unburned	Unknown	No Treatment
H	Basque Homestead	Unburned	Debri/Mud/Flooding	No Treatment
H	Foundation and Chimney	Moderate	Unknown	Private- No Treatment
H	Barn/Garage	Low to Mod	Flooding/Debris	Close
H	Stone House/Guard Sta.	Low to Mod	Flooding/Debris	Close
H	Stone Masonry Retaining Wall	Low to Mod	Flooding/Debris	Recover Sandstone Blocks
P	Ground Stone	Low	Debris/Mud/Flooding	No Treatment
H	Rockshelter with Rock Art	Low to Moderate	Debris/Mud/Flooding	Close
H	Stone Masonry Retaining Wall	Low to Mod	Flooding/Debris	Recover Sandstone Blocks
P	Stone Bowls	Moderate	Mud/Debris	Close and Erosion Blanket
H	Wood Post	Moderate	Not at Risk	No Treatment Recommended
P	Lithic Artifacts	Moderate	Not at Risk	No Treatment Recommended
P	Cupule Boulder	Moderate	Unknown	Forest Adjacent to Private

* Red text denotes sites requiring BAER treatments

Emergency Determination

The Thomas Fire burned 42,000 acres in one burning period at night and proceeded to burn over 280,000 acres within a three week period. Though large portions of the burn area have not been adequately surveyed there are 110 known cultural resources within the burn perimeter. A devastating winter storm was forecasted and made landfall in the burn area five days after the BAER team was initiated. Field assessments were carried out in a triage manner identifying high risk values based on burn severity, archaeological records, and local knowledge. Sixteen archaeological sites were assessed for BAER treatment. Of these, twelve have been determined to require treatment to protect intact cultural deposits and the scientific data they contain. Also, a large number of cultural resources in the burn area are now at an increased risk of being destroyed by looting due to the decrease in foliage, duff, and other natural visual barriers.

In addition to the risk of post-burn environs, proposed treatments by other BAER specialists (hydrologists, soil scientists, geologists, recreation) may have the potential to affect cultural resources and are subject to the provisions of 36 CFR 800**.** Prior to BAER implementation, an archaeologist should be assigned to the implementation team to ensure that inventory and compliance requirements per National Historic Preservation Act and the Region 5 Programmatic Agreement with the California State Historic Preservation Officer are satisfied.

Probability of Damage or Loss: Likely
Magnitude of Consequences: Moderate

Risk Level: High

Protection/Safety

Human Life and Resource protection (Fire Area Closure): To support the Forest closure order and ensure safety for Forest visitors and protection to Forest resources during the recovery period, road closure and information along with BAER warning, signs will be installed around the fire perimeter at main entry points, trailheads and other strategic locations.

B. Emergency Treatment Objectives:

To allow safe passage of water to protect infrastructures, watersheds, cultural sites, and fish habitat from accelerated sheet and rill erosion. Also, to protect watersheds from the spread of noxious weeds. Risk determination is dependent on the design storm selected and downstream values at risk. By using a set of average storms (2and 10-year events) emergency planning measures can be designed to mitigate and minumize anticipated risks. Using a 2-year design storm the values at risk can be evaluated to see how sensitive the watershed is and to determine if an emergency exists for a typical winter storm.

C. Probability of Completing Treatment Prior to Next Damaging Storm or Event:

Land **80** % Channel **n/a** % Roads/Trails **95** % Protection/Safety **90** %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	90%	85%	80%
Channel	n/a	n/a	n/a
Roads/Trails	95%	90%	85%
Protection/Safety	95%	90%	85%

E and F. Summary of VAR Tool Calculations (see Appendix D):

- Market Resource Values (direct losses and loss of use): $9,435,000
- Thomas 2 Fire Treatment Cost: $592,797
- Expected benefit of treatment $740,996
- Benefit/cost ratio = 16.7

As described in this report, threats to life/safety and non-market cultural and ecological values exist throughout the burned area. These values were described in the abreviated VARTool Assessment spreadsheet considered in the benefit/cost ratio. Although not represented in the calculations, all proposed treatments reduced risk for multiple market and non-market values at risk. These important indirect benefits are not represented in the calculations.

G. Skills Represented on Burned-Area Survey Team:

Hydrology	Soils	Geology	Engineering
Archeology	Recreation	Botany	Wildlife & Fisheries

Team Leader: Brad Rust	Email: brust@fs.fed.us	Phone: 530-226-2427

Pancho Smith	District Ranger	psmith@fs.fed.us
Kevin Cooper	BAER Team Coordinator	kcooper@fs.fed.us

H. Treatment Narrative for Forest Service:

Land Treatments

A. Treatment Type
The treatment is noxious weed detection surveys of all roads, dozer lines, drop points, and safety zones affected by the Thomas Fire on NFS lands. These areas will be surveyed for evidence of introduction or spread of noxious weeds. If any new or outlying populations are found, these will be mapped and documented for future treatment and where possible hand treatments will be applied during at the same time the surveys are conducted.

B. Treatment Objective
Evaluate and eliminate the potential for noxious invasive weed establishment and spread, in all areas affected by the Thomas Fire suppression activities.

C. Treatment Description
Inspect all areas and monitor for newly established weed occurrences. Monitoring will include documentation and hand pulling small new weed occurrences at the time of inspection. New weed occurrences will be pulled to root depth, placed in sealed plastics bags, and properly disposed.

Documentation of new infestations will include:

- GPS negative and positive inspection results
- Incorporate data into GIS spatial database - NRIS
- Establish photo points
- Map perimeter of new infestation
- Estimate number of plants per square meter
- Treatment method
- Dates of treatment
- Evaluate success in subsequent inspection

Inspections and monitoring should be accomplished during March/July 2018. Based upon the first year's survey, additional surveying may be requested for up to three years. BAER funding is only requested for the first year after fire.

D. Treatment Cost – EDRR

Natural Recovery

Vegetation in the mixed conifer will recover slowly. Even in areas of moderate soil burn severity, the canopy was mostly killed and the seed source removed. Stands with an element of Ponderosa pine and Douglas fir will likely recover more quickly, since at least a few mature trees are likely to have survived to produce seed into newly exposed mineral soil. The montane chaparral shrubs were mostly killed by the fire, but fire stimulates manzanita seeds stored in the soil to germinate along with other re-sprouting species. Redwoods in the stream bottoms for the most part survived. The ones that succumbed to having their cambium burned due to deep litter and duff around the base of the tree will resprout at the base and will create a new tree.

Road and Safety Treatments:

Treatment Objective: Minimize the risk of road failure in the burn area through the placement and maintenance of effective water control measures. Prevent the channeling of water on roads. Ensure the diversion of runoff in controlled intervals to reduce erosion and further watershed degradation. Road treatments along with Storm Inspection and Response monitors and maintains the function of drainage features, and ensure road access for FS administration, permitees, and private in-holders.

Road Treatments:

Safety and Protection

Treatments to mitigate the risks to life and safety is administrative closure by order of the fire area. Treatments include utilizing existing closure gates, installing road closure signs post-fire the first season, installing BAER warning and information signs to replace closure signs at main entry points once the fire area is reopened to the public; close existing gates post-burn operation; inspect roads in the spring before opening respond accordingly to road damage and public safety concerns; patrol and maintained closure signs at main entry points the first season; patrol and maintain BAER warning and information signs at main entry points once the administrative closure is lifted and the public access is allowed.

Closure Gates: Main entry points accessing the fire area have existing gates across forest roads. Several of these existing gates will require re-signing to MUTCD standards.

Signs: The following locations were identified as a signage strategy for main entry points of the Thomas Fire:

1. Chismahoo/Superior road west end of NFSR 4N05 at MP-0.3 from the intersection with HWY 150
2. Chismahoo/Superior road east end of NFSR 4N05 at the existing gate MP-1.2 from the intersection with HWY 150
3. Laguna Ridge NFSR 4N10 at the existing gate near the intersection with HWY 150
4. Sisar Canyon NFSR 4N15 forest boundary at the existing gate MP-0.5 from the intersection with HWY 150
5. East Camino NFSR 5N12 and 5N13 end of pavement at the existing gate MP-6.3 from the intersection with Camino Cielo road
6. Matilija/Murietta NFSR 5N13 at the existing gate MP-4.6 from the intersection with HWY 33

7. Chief Peak NFSR 5N42 at the existing gate MP-3.3 miles from the intersection with HWY 33
8. Cherry Canyon NFSR 6N01 at the existing gate near the intersection with HWY 33.
9. 12 flash flood signs at low water crossings identified in the hydrology BAER specialist report. Signage Costs = $4860

Property:

It has been determined through the BAER Risk Assessment process that it is likely that post-burn conditions in the Thomas fire area will increase runoff and the movement of sediment into some road drainage features, such as culvert inlets, over side drains, roadside ditch lines, roadway dips and runouts, along certain segments of NFSR 4N05 (Chismahoo/Superior), 5N12 (East Camino), 5N13 (Mitilija/Murietta), 5N15 (Romero Camuesa), and 5N16 (Big Caliente). The magnitude of this occurrence is considered moderate and puts property (roads) at risk for blockage and uncontrolled water to divert, resulting in likely damage to the invested road improvements, and a risk to road users. Accepted and economical BAER road treatments to mitigate the risk to property including restoring drainage function (storm proofing), constructing roadway relief dips down grade of culvert crossings (critical dips), installing vertical riser pipes on culvert inlets (snorkels), fill slope and critical dip protection installing rip/rap rock (drainage armor), and channel excavation upstream of culverts. These proposed road treatments will help storm proof and prepare the roads for the winter season. Storm inspection and response will monitor accomplished road treatments and assure access.
Resource Values / Cultural Resources

Archaeological surveys identified several sites in the Thomas Fire area. There is no recommendation to mitigate road related effects to these sites.

Road Treatment Cost:

Item	Unit	# of Units
Restore Drainage Function (Storm Proofing)	Mile	24
Install Culvert Riser (Storm Proofing)	Each	21
Install Critical (Rolling) Dip (Storm Proofing)	Each	27
Drainage Armoring (Storm Proofing)	Each	15
Clean and Restore Channel (Storm Proofing)	Each	2
Storm Inspection & Response 10 miles (line item)	Days	3
Sub Total		
Contract prep, Administration and Implementation	%	1
Total		

Trail Treatments

To mitigate threats to life and health, close trails and recreation sites affected by the fire (as part of an area closure) for the first winter following the fire, and prior to lifting the closure, install warning signs at all trailheads within or leading to the burned area. Trailheads requiring warning signage are Tequepis Trail (Forest Trail 29W06), whose termini are West Camino Cielo Road and Tequepis Canyon Road (Forest Road 6N04).

To mitigate threats to property install trail erosion structures (rolling dips, check dams, log erosion barriers, and drainage armoring) to maintain natural drainage patterns and maintain trail stability during increased flows. Rolling dips, check dams, and log erosion barriers (LEBs) will stabilize trail tread and prevent further erosion caused by the loss of vegetation and root systems previously supporting outer trail edge. Armoring key ephemeral drainages is done by placing rock in a rip-rap fashion below trail in drainages to dissipate energy of across trail water flows and prevent down slope head cutting and trail loss. LEBs may be used in place of rock armoring when rock is unavailable.

Specific treatments recommended for the Tequepis Trail are:

Closure: All trails and recreation sites affected by the fire should be closed for the first winter following the fire. Conditions following the first winter should be evaluated to judge if additional time is needed to provide for user safety or resource protection. If additional time is needed, it can be obtained through an extension of the original forest order mandating an area closure and leaving existing closure signage in place.

Prior to lifting the closure, warning signs should be installed at all trailheads within or leading to the burned area. This will make visitors aware of potential hazardous conditions that may remain. Trailheads at both ends of the Tequepis Trail (29W06) will requiring warning signs.

Storm Proofing: Installing trail drainage structures will maintain natural drainage patterns and trail stability for the increased flows during the first winter. Storm proofing measures relevant to fire-related concerns found on the Thomas Fire trail system include: (1) cleaning and improvement of 16 existing rolling dips; (2) installation of 28 additional rolling dips, including one on an abandoned road that intersects the trail; (3) removal of a plugged culvert and installation of an armored low water crossing in its place; (4) armoring seven key ephemeral drainages to prevent head cutting and loss of trail tread. The last action will require the placement of rock or logs below drainages to dissipate the energy of off-trail water flows and decrease the likelihood of down bank erosion. In addition to protecting the trail itself, these stabilization measures will also reduce detrimental effects to downstream values at risk.

Note: storm proofing treatments include log outs necessary to make the work sites accessible and free of hazard trees and to allow for safe crew egress in case of emergency.

Monitoring: Periodic trail inspections will be needed to monitor the effectiveness of the treatments. The inspections should be conducted after significant weather events. The inspectors will correct minor problems and report significant issues on and along the trail. They should also check for public usage of the trail in order to monitor the effectiveness of the forest closure. Based on information gathered on treatment effectiveness monitoring, an interim request may be submitted to the region for consideration for additional funding to correct problems in response to unforeseen storm damage.

Estimated costs for these treatments are summarized in the following tables:

Table 1: BAER Treatment Recommendations

Site/Trail	Recommended Emergency Response Action	Recommended Specific Action
Lower 1.45 miles of the Tequepis Trail	Trail prism drainage treatment and monitoring	Clean out / improve approximately 16 existing rolling dips / waterbars, install approximately 28 new rolling dips, replace one plugged culvert with an armored low water crossing, and armor seven other drainage crossings.
All trails and recreation sites within the burned area	Closure for first winter	Can be implemented as part of an area closure. Trails and recreation sites should be inspected prior to lifting the closure.
Major entry points into burned area	Install closure signs	Can be implemented as part of an area closure.
Trailheads leading into burned area	Install warning signs prior to lifting of closure	Install signs at each end of the Tequepis Trail, to remain after closure is lifted.

Estimated Treatment Costs:

Table 2: Trail Treatment Costs

Project labor requirements assume that a trail dozer accompanied by an operator, a swamper, and two laborers will be used to perform the treatment work. Project labor cost estimates assume an off-Forest force account crew with an average cost to government for each crew member of $250/day. One vehicle will be capable of towing the trail dozer carrier and the other will provide support. Mileage includes round-trip travel between the home unit and the project area.

Funds are also included to pay for a District recreation officer from the local unit ($420/day) to administer the project, for a field ranger ($280/day) to assist the off-Forest crew, and for local resource specialists (archaeologist / wildlife biologist / fisheries biologist / botanist, average $425/day) to provide consultation and oversight.

Table 3: Monitoring Costs

Each monitoring inspection tour will cover the treated area of the trail and will require two inspectors for safety reasons ($280/day each). The budget allows for monthly inspections during the winter season (November through April), which should be sufficient to allow minor damage to be corrected and major damage to be reported after each round of significant weather events.

Protection/Safety Treatments

Burned Area Closure and Warning Signs

Posting of areas burned will alert the public to potential dangers of falling trees and rolling rocks. For roads, the recommended treatment is installation of seasonal closure and warning signs at major points of entry. The following locations were identified as a signage strategy for main entry points of the Thomas Fire perimeter. As soon as possible install road and area closure signs with associated information at the above existing and new closure gate locations. After the fire area administrative closure has been lifted replace road and area closure signs at these locations with typical BAER Warning signs, to warn potential road users that they are entering a burned watershed.

Protection and Safety Cost

Heritage Treatments

When the BAER Risk Matrix is applied to cultural resource sites in the Thomas Fire, the risk to cultural sites is high.

Proposed treatments made by other specialists (hydrologists, soil scientists, geologists) that have the potential to affect cultural resources are subject to the provisions of 36 CFR 800**.** Prior to BAER implementation, an archaeologist should be assigned to the implementation team to ensure that inventory and compliance requirements per NHPA and the R5/SHPO Programmatic Agreement are satisfied.

Treatments to Mitigate the Emergency

Exposed Cultural Resources - Signage:

(a) Treatment Type: Install signage related to closure areas and the Archaeological Resource Protection Act and other policy to help protect exposed sites of being looted and/or impacted by unauthorized OHV.
(b) Treatment Objective: Provide an avenue to prosecute looters within the burn area and prevent the destruction of important cultural resources.
(c) Treatment Description: 11“ x 16” metal educational signs that inform the public about the importance of cultural resources and the laws protecting them. Signs will be both in English and Spanish. Informational signs increase the viability of criminal prosecution through the Archaeological Resource Protection Act of 1979 (ARPA). Forest Service Law Enforcement will be contacted to respond to any illicit activities pertaining to cultural resources. Carsonite sensitive area and closure signs will also be installed to protect sensitive areas from pedestrian and vehicular impacts.
(d) Risk Assessment Process: Exhibit 2 of Interim Directive No.: 2520-2010-1 was used to evaluate the Risk Level for each valued identified during Assessment.
Result = *Very High*

(e) Treatment Cost:

Site Stabilization:
(a) Treatment Type: Installation of erosion protection material on dense concentrations of artifacts within archaeological sites at high risk.
(b) Treatment Objective: Mitigate increased erosion associated with soil burn severity and exposure to storm events.
(c) Treatment Description: Placement of erosion material on high risk archaeological sites.
(d) Risk Assessment Process: Exhibit 2 of Interim Directive No.: 2520-2010-1 was used to evaluate the Risk Level for each valued identified during Assessment.
Result = *Very High*

(e) Treatment Cost:

Retrieval of CCC Era Stone Retaining Wall Elements:

(a) Treatment Type: Recover CCC era sandstone hand cut blocks dislodged from bridge retaining wall in Wheeler Gorge washed into Matilija River below archaeological site to protect cultural resource at risk.

(b) Treatment Objective: Retrieve the artifacts washed into the river below prior to additional flooding and mud/debris flows as a result of anticipated storm events.
(c) Treatment Description: Contract a crane and operator to move the hand cut blocks back onto the bridge and out of the Matilija River channel.
(d) Risk Assessment Process: Exhibit 2 of Interim Directive No.: 2520-2010-1 was used to evaluate the Risk Level for each valued identified during Assessment.
Result = *Very High*

(e) Treatment Cost:

Post-Implementation Treatment Monitoring:

(a) Treatment Type: Monitor the effectiveness of implemented BAER treatments.
(b) Treatment Objective: Assess effectiveness of BAER treatments.
(c) Treatment Description: Monitor the effectiveness of treated archaeological sites. Ensure treatments remain in place during the rainy season including stabilization efforts and that closure and warning signs stay posted. In addition, monitoring will assess whether or not the treatments prevented off-road travel and looting on those sites. Possible measures for monitoring effectiveness include but are not limited to: whether surface artifacts remain on the site as mapped; whether pot hunting holes are observed on site; whether there is additional development of trail or two track roads in the site; the number of Law Enforcement contacts and ARPA violations reported; and whether the site blends with the natural environment such that vandalism doesn't occur.
(d) Risk Assessment Process: Exhibit 2 of Interim Directive No.: 2520-2010-1 was used to evaluate the Risk Level for each valued identified during Assessment.
Result = *Very High*

(e) Treatment Cost:

Totals

Wildlife

Treatment Type: Removing exposed micro-trash from Cherry Creek shooting sites on Ojai RD.

Treatment Objective: Removing materials exposed by the fire on the west side of Cherry Creek Road, which otherwise might be ingested by adult condors or fed to condor chicks.

Treatment Description: Hand crews (recreation trail crew or fire fighters) would remove all exposed micro-trash which occurs within the burned over shooting sites on the west side of Cherry Creek Road.

Treatment Cost:

Implementation Team Leadership and Coordination and Implementation Leader

Interagency Coordination:
Interagency coordination started during the fire and continued throughout the BAER Assessment. Continuing this coordination by providing the BAER Assessment Report, specialist reports and attending meetings is anticipated. In addition, letters detailing potential physical responses and impacts from the

fire that may influence safety in and downstream of the fire area will need to be composed and sent to all public and private stakeholders at risk from increased sediment and flooding. Funding is requested for agency coordination, Implementation team lead, and for the Forest BAER Coordinator to ensure continued coordination with cooperating agencies, prompt implementation, tracking of BAER treatments, and installation of burn area warning signs. The facilitation may include: phone calls, meetings, and field trips to the affected areas.

A part time implementation leader will be needed to help organize and track the road work, trail work, signage, and to compile costs and update reports. There will be separate and additional trail and road implementation leaders who's cost is covered in those sections.

Table 11 – BAER Interagency Coordination

I. Monitoring Narrative:

(Describe the monitoring needs, what treatments will be monitored, how they will be monitored, and when monitoring will occur. A detailed monitoring plan must be submitted as a separate document to the Regional BAER coordinator). See Appendix B below for road, trail, and heritage monitoring.

Part VI – Emergency Stabilization Treatments & Source of Funds, Los Padres NF Initial Request

PART VII - APPROVALS

1. _____ _____
Los Padres N.F. Forest Supervisor (signature) Date

2. _____ _____
Regional Forester (signature) Date

APPENDICES: Supporting Information:

Appendix A: Thomas Fire Fire BAER Team

Appendix B: Soil Burn Severity Map

Appendix C: Monitoring for Roads, Trails, and Hertitage

Appendix D: Thomas Values at Risk Matrix, Treatments and Recommended Post-Fire Response

Appendix E: Summary of Cost-Risk Analysis

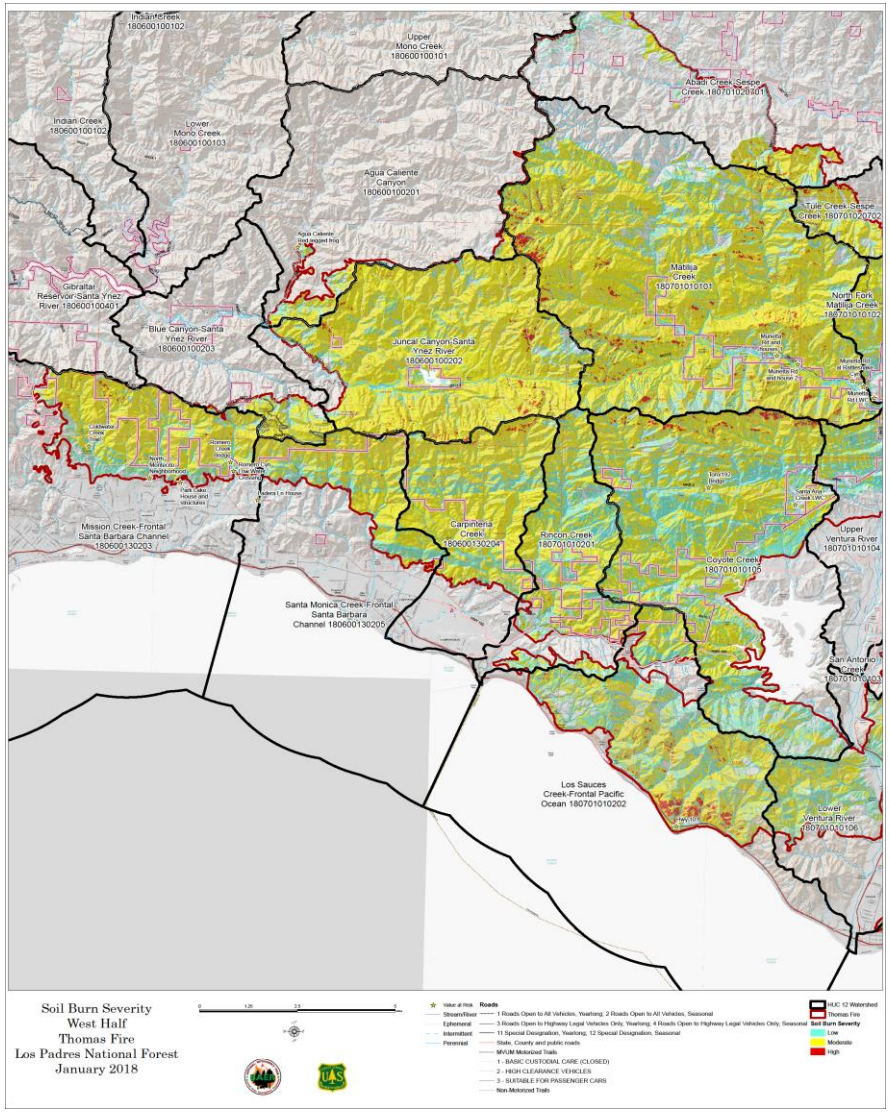
Appendix F: Treatment Maps for the Thomas Fire

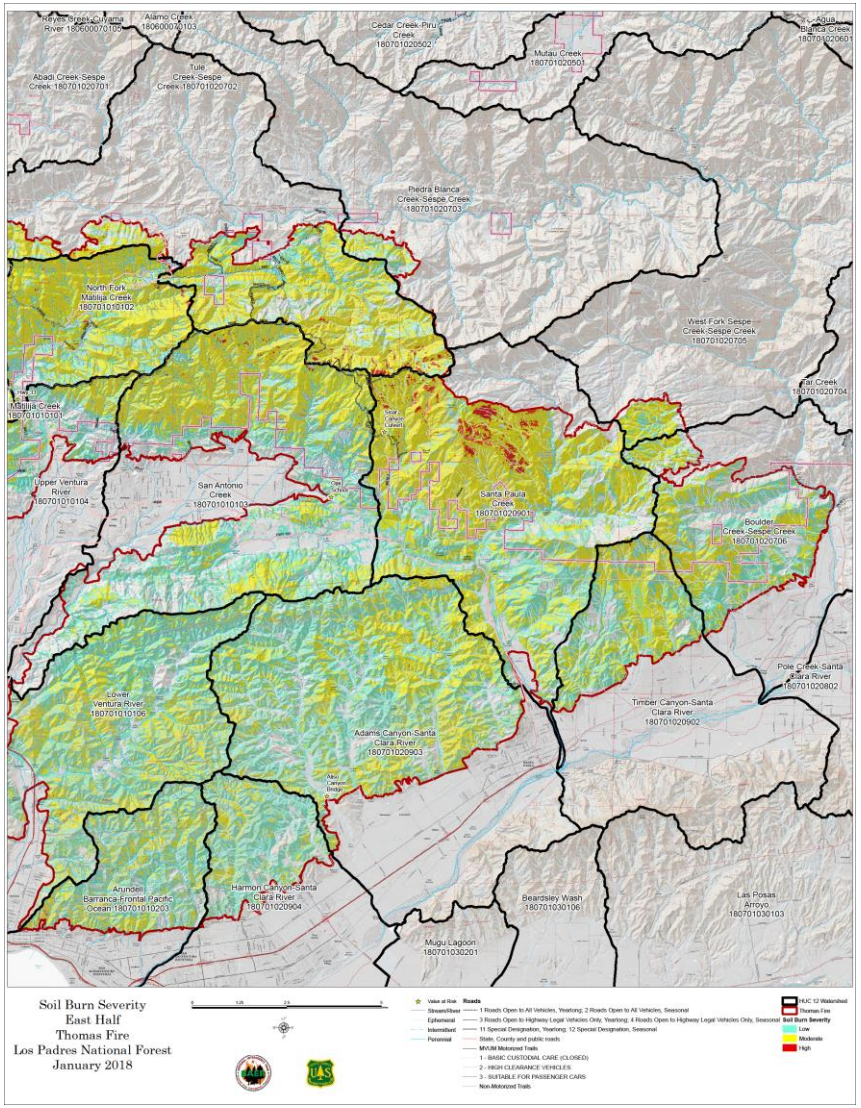
Appendix A: Thomas Fire BAER Team:

NAME		FUNCTION		PHONE		E-MAIL		O#
Dorit Buckley		Arch		530-680-3347		dbuckley@fs.fed.us		1
Allen King		Geologist	AD	805-729-2527		allen.king7@gmail.com		2
Dennis Veich		Geologist		530-515-7414		dennisveich@fs.fed.us		3
Brad Rust		Team Ld		530-917-0434		brust@fs.fed.us		4
Cathy Carlock		Logistics		530-569-0060		ccarlock@fs.fed.us		5
Patrick Lieske		Wildlife		541-661-4415		pdlieske@fs.fed.us		6
Kristie Klose		Fisheries		805-257-7019		kristieklose@fs.fed.us		7
Eric Nicita		Soils		805-680-0318		enicita@fs.fed.us		8
Emily Fudge		Hydro		775-240-5714		efudge@fs.fed.us		9
Steven Galbraith		Arch		805-729-5587		sgalbraith@fs.fed.us		10
Renee Barlow		Arch		831-277-7650		katherinebarlow@fs.fed.us		11
Alvin Sarmiento		Engineer		530-708-1363		alvinsarmiento@fs.fed.us		14
Dave Young		Soils		530-768-4760		daveyoung@fs.fed.us		15
Diane Cross		Trails		805-895-7464		dcross@fs.fed.us		17
Anna Courtney		Soils		630-632-5589		annamcourtney@fs.fed.us		19
Kevin Cooper		Liasion		831-915-3838		kccooper@fs.fed.us		20
Erich Huebner		Trails	AD	209-743-9507		erich31@sbcglobal.net		21
Rusty LeBlanc		Engineer	AD	209-591-7518		raleblanc14@gmail.com		23
Kyah LaPorta		Trails		805-699-1562		llaporta@fs.fed.us		25
Tom Murphey		Trails		831-915-3838		tmurphey@fs.fed.us		26
Marlyn Porter		GIS		714-305-9177		mrporter@fs.fed.us		28
Lloyd Simpson		Botany		805-901-2869		lsimpson@fs.fed.us		local
Ricki Willey		Botany				rickiwilley@fs.fed.us		local
Heidi Anderson		Trails		805-798-1842		heiditrails@gmail.com		local
Cassie Tragert		Wildlife		478-483-8963 office		ctragert@fs.fed.us		local
Manny Madrigal		PIO		805-550-6905		manuel48@sbcglobal.net		local

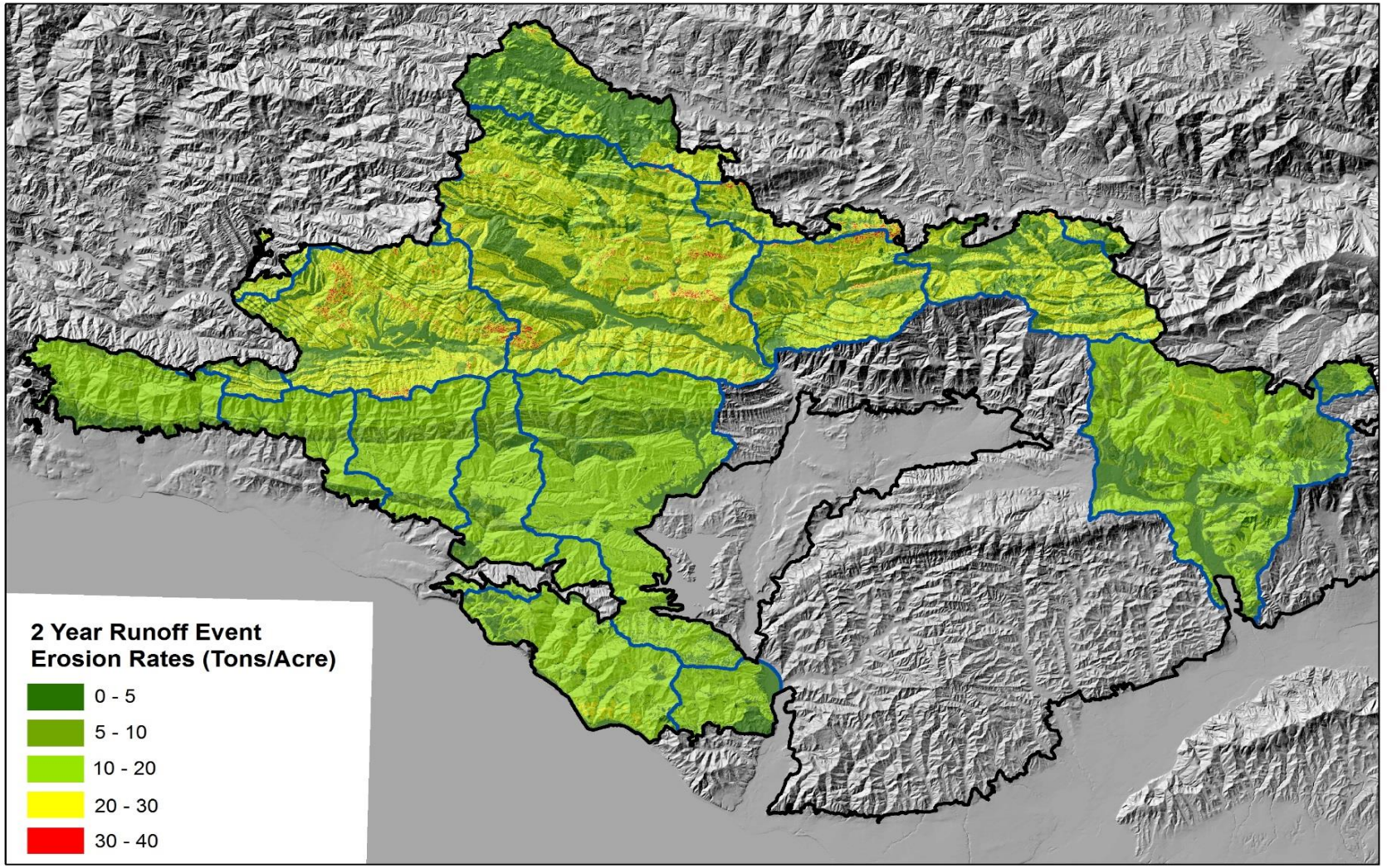
Appendix B: Soil Burn Severity, Sedimentation, Hydrologic Response, and Debris Flow Hazard Maps:

Soil Burn Severity

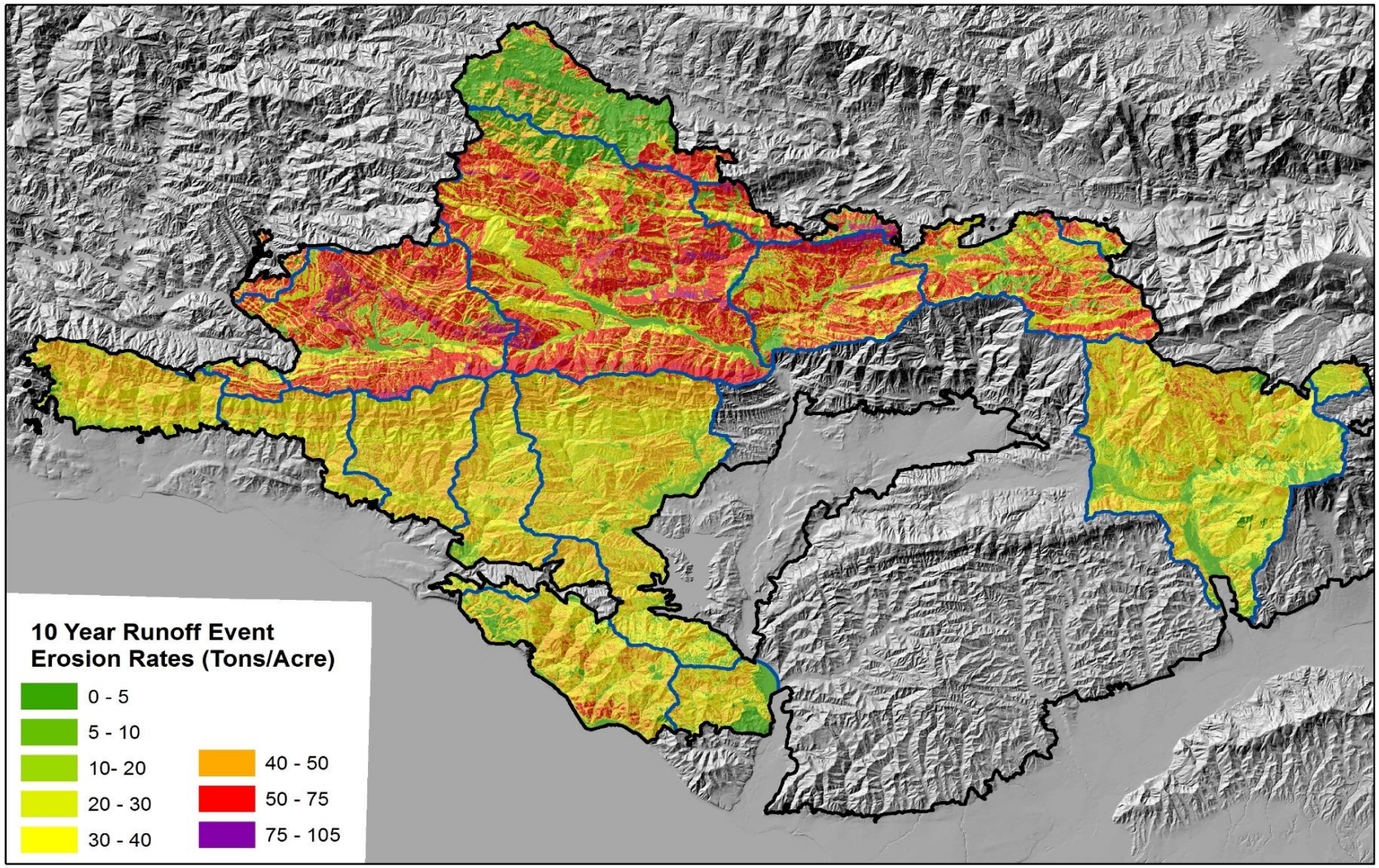

Soil Burn Severity
West Half
Thomas Fire
Los Padres National Forest
January 2018


Soil Burn Severity
East Half
Thomas Fire
Los Padres National Forest
January 2018

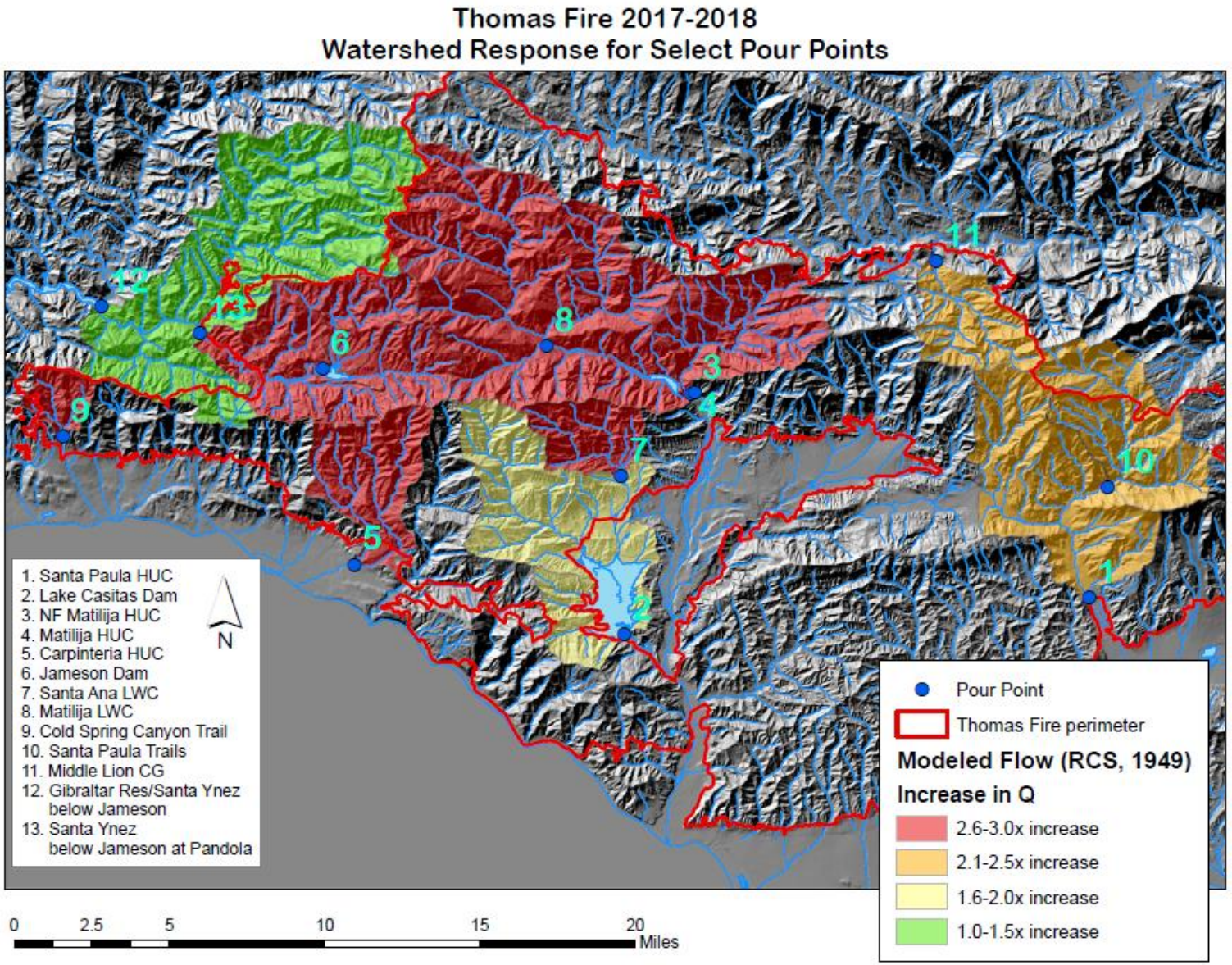
ERMiT Erosion Potential - 2 Year



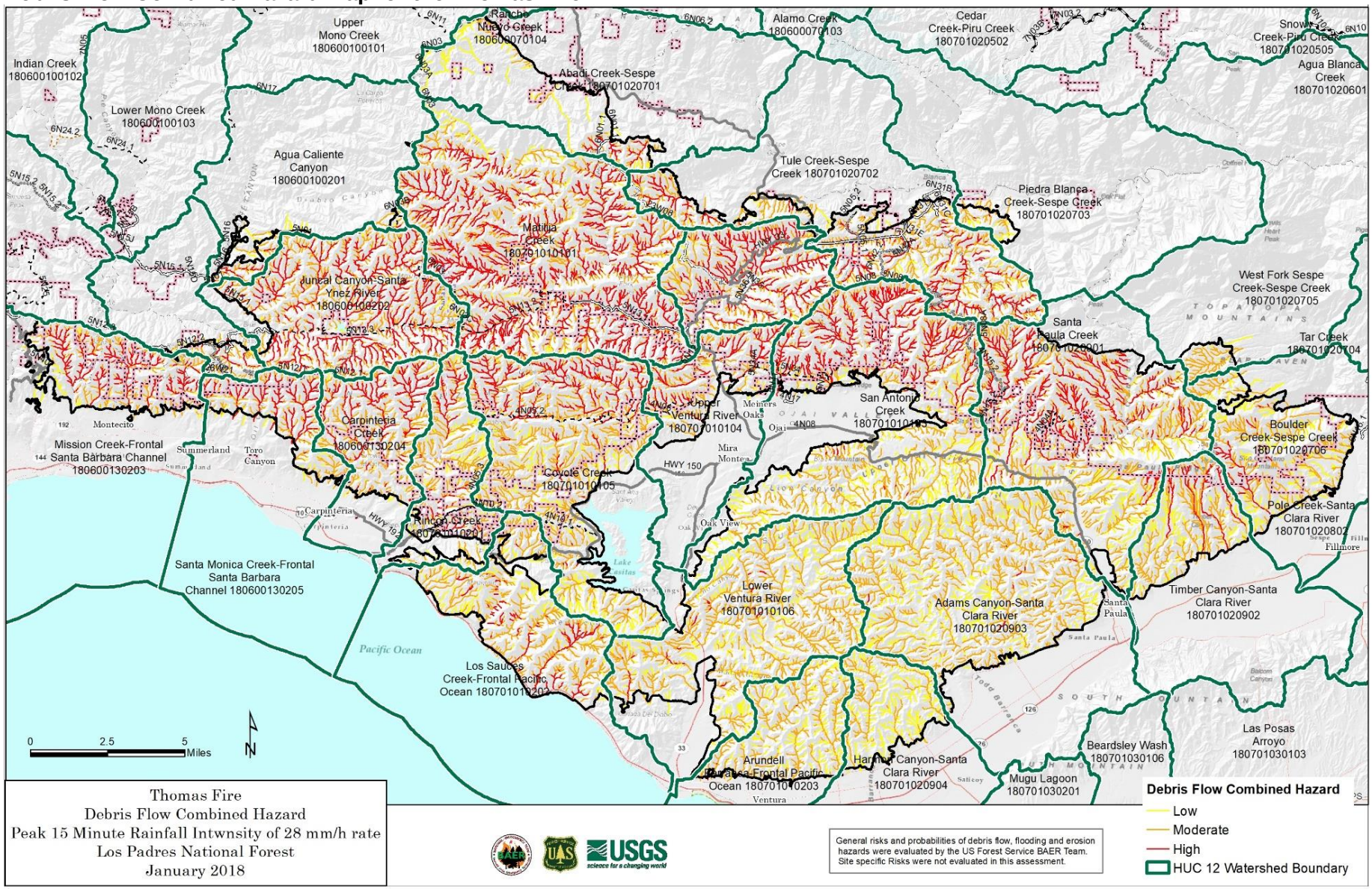
ERMiT Erosion Potential - 10 Year



Hydrologic Response Map for the Thomas Fire (2-year and 10-year storms)



Debris Flow Combined Hazard Map for the Thomas Fire



Appendix C: Monitoring Protocols:

Thomas Fire
Road Effectiveness Monitoring

The 2500-8 report requests funds to monitor the effectiveness of road treatments on Thomas Fire roads.

4. Monitoring Questions
- Is the road-tread stable?
- Is the road leading to concentrating runoff leading to unacceptable off-site consequences?

2. Measurable Indicators
- Rills and/or gullies forming of the road
- Loss of road bed.

3. Data Collection Techniques
- Photo documentation of site
- Inspection Checklist (attached)

4. Analysis, evaluation, and reporting techniques

- Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing road and there is extensive loss of road bed or infrastructure an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Road Inspection Checklist

Date:_____ Inspector_____
Time:_____ Forest Road_____

Describe locations reviewed during inspection:_____

Was there road damage?

Was culvert plugged?_____.

GPS _____

Describe damage and cost to repair? (GPS)_____

Photo taken of road damage_____

Recommended actions to repair:_____

Thomas Fire

Trail Effectiveness Monitoring

The 2500-8 report requests funds to monitor the effectiveness of trail treatments on Forest Trails in the Thomas Fire.

1. Monitoring Questions
   - Is the trail tread stable?
   - Is the trail leading to concentrating runoff leading to unacceptable off-site consequences?

2. Measurable Indicators
   - Rills and/or gullies forming on the trail
   - Loss of trail bed

3. Data Collection Techniques
   - Photo documentation of site
   - Inspection Checklist (attached)

4. Analysis, evaluation, and reporting techniques

   - Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing trail and there is extensive loss of trail bed or infrastructure an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Trail Inspection Checklist

Date:_____ Inspector_____
Time:_____ Forest Trail_____

Describe locations reviewed during inspection:_____

Was there trail damage?
Did the trail crossing fail?_____. GPS)_____

Describe damage and cost to repair? (GPS)_____

Photo taken of trail damage_____

Recommended actions to repair:_____

Thomas Fire

Cultural Site Effectiveness Monitoring

The 2500-8 report requests funds to monitor the effectiveness of native grass treatment on Thomas heritage sites.

4. Monitoring Questions
- Is the grass with good cover stable?
- Is the grass being undercut by concentrated runoff leading to unacceptable on-site erosion?

2. Measurable Indicators
- Rills and/or gullies forming around the artifacts
- Loss of artifacts

3. Data Collection Techniques
- Photo documentation of site
- Inspection Checklist (attached)

4. Analysis, evaluation, and reporting techniques

- Monitoring will be conducted after storm events. If the monitoring shows the treatment to be ineffective at stabilizing and there is extensive rilling an interim report will be submitted. A several page report would be completed after the site visit. The report would include photographs and a recommendation on whether additional treatments are necessary.

Heritage Protection Inspection Checklist

Date:_____ Inspector_____
Time:_____ Forest Road Nearby_____

Describe locations reviewed during inspection:_____

Was there artifact damage?

Was artifacts covered or eroded?_____.

GPS)_____

Describe damage and cost to repair? (GPS)_____

Photo taken of artifact damage_____

Recommended actions to repair:_____

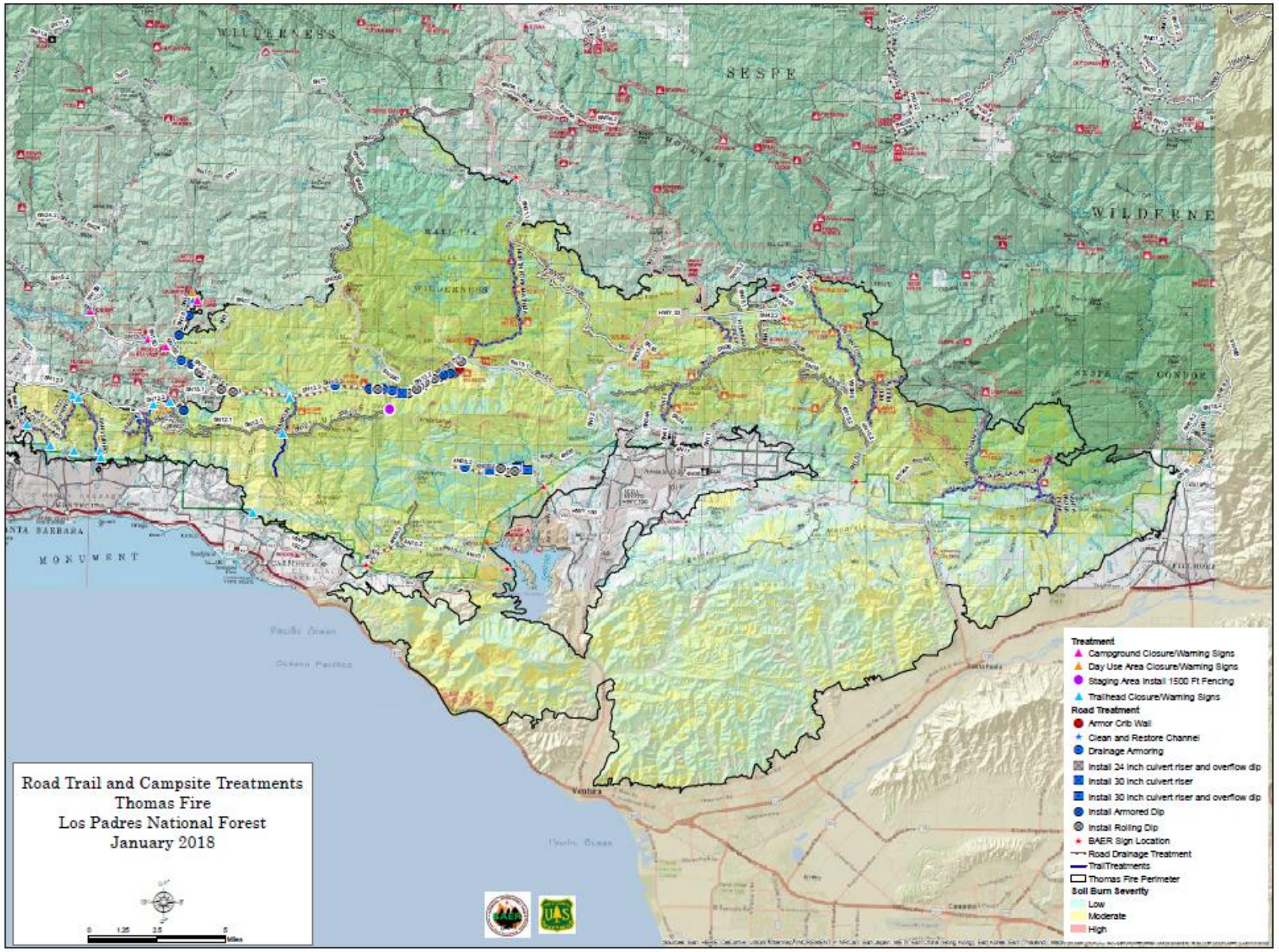
Appendix D: Thomas Values at Risk Matrix, Treatments and other recommended Post-Fire Response

Thomas BAER Risk Matrix

VAR	Latitude	Longitude	Value	Type of Risk	Post Fire Threats	Probability			Magnitude of Consequences			Risk			Treatment to Manage Potential Post Wildfire Impacts			
	or Location					Life	Property	Other	Life	Property	Other	Life	Property	Other	Life	Property	Other	Responsibility
1	Hwy 150 Gates @ FS Boundary		Life/safety associated w/ Superior Road 4N05 East and West ends	Safety, road structure	rock fall, sediments, erosion	Possible			Major			High			Road Closure/BAER Signs @entry points			FS, Pvt
2	Hwy 150 Gate @ FS Boundary		Life/safety associated w/ Laguna Ridge Road 4N10	Safety, road structure	rock fall, sediments, erosion	Possible			Major			High			Road Closure/ BAER signs @ entry points			FS
3	Jct. Hwy 150 Gate @ FS Boundary		Life/Safety associated w/ Sisar Canyon Road 4N15	Safety, road structure	rock fall, sediments, erosion	Possible			Major			High			Road Closure/ BAER signs @ entry points			FS
4	End of pavement Gate @ MP-6.3		Life /Safety associated w/ East Camino Roads SN12 & SN13	Safety, road structure	rock fall, sediments, erosion	Possible			Major			High			Road Closure/BAER Signs @entry points			FS
5	Jct. Hwy-33 Gate @ MP-4.6		Life/Safety associated w/ Matilija/Murietta Road SN13	Safety, road structure	rock fall, sediments, erosion	Possible			Major			High			Road Closure/BAER Signs @entry points			FS
6	Jct. w/6N31 @ Gate MP-3.3		Life/Safet associated w/ Chief Peak/Nordhoff Roads SN42 & SN08	Safety, road structure	rock fall, sediments, erosion	Possible			Major			High			Road Closure/BAER Signs @entry points			FS
7	Jct. Hwy 33 @ gate		Life /Safety associated w/ Cherry Canyon Road 6N01	Safety, road structure	rock fall, sediments, erosion	Possible			Major			High			Road Closure/BAER Signs @entry points			FS
9	5N12.2 - East Camino Road		Access to multiple campgrounds, Murieta Road, and Jameson Lake	Road Infrastructure	rock fall, sediments, erosion		Likely			Moderate			High			Stormproofing, Clean Drainage Features		FS
10	5N15.1 - Romero Camuesa Road		Access to multiple campgrounds, Murieta Road, and Jameson Lake	Road Infrastructure	rock fall, sediments, erosion		Likely			Moderate			High			Stormproofing, Clean Drainage Features		FS
11	5N16 - Big Caliente		Access to Big Caliente Hot Springs	Road Infrastructure	rock fall, sediments		Likely			Moderate			High			Stormproofing, Clean Drainage Features		FS
12	5N13.3 - Murietta Road		Access to Jameson Lake from Santa Barbara	Road Infrastructure	rock fall, sediments, erosion		Likely			Moderate			High			Stormproofing, Clean Drainage Features		FS
13	5N13.2 - Murietta Road		Access to Jameson Lake from Ojai	Road Infrastructure	rock fall, sediments, erosion		Likely			Moderate			High			Stormproofing, Clean Drainage Features		FS
14	4N05.3 - Superior Ridge Road		Access to private property and range resource	Road Infrastructure	rock fall, sediments, erosion		Likely			Moderate			High			Stormproofing, Clean Drainage Features		FS, Pvt
15	4N05.2 - Superior Ridge Road		Access to private property and range resource	Road Infrastructure	rock fall, sediments, erosion		Likely			Moderate			High			Stormproofing, Clean Drainage Features		FS
16	4N10.1 - Laguna Ridge Road		Access to private property and range resource	Road Infrastructure	rock fall, sediments, erosion		Likely			Moderate			High			Road Closure		FS
17	West Fork Cold Springs Trail (27W16)		Trail prism as an investment	Infrastructure	Erosion	Likely	Likely		Major	Moderate		Very High	High		Closure	Stormproof		FS
18	Cold Spring Grail (26W10)		Trail prism as an investment	Infrastructure	Erosion	Likely	Likely		Major	Moderate		Very High	High		Closure	Stormproof		FS
19	San Ysidro Trail (26W15)		Trail prism as an investment	Infrastructure	Erosion	Likely	Likely		Major	Moderate		Very High	High		Closure	Stormproof		FS
20	Romero Trail (26W14)		Trail prism as an investment	Infrastructure	Erosion	Likely	Likely		Major	Moderate		Very High	High		Closure	Stormproof		FS
21	Franklin Trail (25W09)		Trail prism as an investment	Infrastructure	Erosion	Likely	Likely		Major	Moderate		Very High	High		Closure	Stormproof		???
22	Divide OHV Staging Area		Natural resources	Human Life and Safetly	Trespass	Likely	Very Likely		Major	Moderate		Very High	V High		Barricade	Barricade		FS
23	Big Caliente Day Use		Recreational opportunities for forest visitors	Infrastructure	erosion	Likely	likely		Major	Moderate		Very High	High		Closure	Monitor		FS
24	Rock Creek Campground		Recreational opportunities for forest visitors	Infrastructure	erosion	likely	likely		Major	Moderate		Very High	High		Closure	Monitor		FS
25	Middle Santa Ynez Campground		Recreational opportunities for forest visitors	Infrastructure	erosion	likely	likely		Major	Moderate		Very High	High		Closure	Monitor		FS
26	P-Bar Campground		Recreational opportunities for forest visitors	Infrastructure	erosion	likely	likely		Major	Moderate		V High	High		Closure	Monitor		FS
27	Mono Campground		Recreational opportunities for forest visitors	Infrastructure	erosion	likely	likely		Major	Moderate		V High	High		Closure	Monitor		FS
28	Divide Peak OHV Route (26W21)		Recreational opportunities for forest visitors	Infrastructure	Erosion	Likely	Likely		Major	Moderate		V High	High		Closure	Monitor		FS
29	**Lake Casitas**		**Water quality and treatability for -----, dam capacity**	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.		V. Likely								Interagency Coordination	Interagency Coordination		water districts
30	Jameson Reservoir		Water quality and treatability for ----, dam capacity	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.		V. Likely								Interagency Coordination	Interagency Coordination		water districts
31	Matilija Reservoir		Infrastructure, life/safety with dam failure	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	Possible?	V. Likely								Interagency Coordination	Interagency Coordination		water districts
32	Gibraltar Reservoir		Water quality and treatability? Capacity? infrastructure?	Life, Safety, Infrastructure?	flooding, mudflows.		Likely								Interagency Coordination	Interagency Coordination		water districts
33	HWY 33		HWY 33 infrastructure, life/safety	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination	Interagency Coordination		CalTrans
34	Throughout		FS road/stream crossings and LWCs	Life, Safety, Infrastructure, natural resources (water quality)	flooding, mudflow, debris flows, sedimentation	Possible	V. Likely		Major	Moderate?		High	V High		Closure. Signage.			FS
35	Throughout		FS road system	Life, Safety, Infrastructure, natural resources (water quality)	flooding, mudflow, debris flows, sedimentation	Possible	V. Likely	V.Likely	Major	Moderate?	Moderate	High	V High		Closure. Signage.	Road work to prevent failure	Road work to prevent washout.	FS
36	Throughout		FS trails and trail stream crossings	Life, Safety, Infrastructure, water quality	flooding, mudflow, debris flows, sedimentation	Possible	V. Likely	Likely	Major	Moderate?	Minor	High	High		Closure. Signage.	Trail work to prevent failure	Trail work to prevent failure.	FS
37	34.54963	-119.16621	Middle Lion FS CG and access road	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	Likely			Major	Moderate?		V High			Closure. Signage.			FS
38	34.5328	-119.18245	Rose Valley FS CG and access road	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	Likely			Major			V High			Closure. Signage.			FS
39	34.50926	-119.57959	Middle Santa Ynez FS CG	Life, Safety	mudflow, flooding	Possible			Major			High			Closure. Signage.			FS
40	34.51484	-119.58728	P-Bar Flats	CG not at risk.											Closed by association. No access.			FS
41	34.50991	-119.57499	Pandola Station--shed and adjacent road	Life, Safety, Infrastructure	mudflow, flooding	Unlikely	Possible		Moderate	Moderate?		Low	Intermediate		Closure of station.	Sandbags at base. Add waterbars to road.	Add waterbars to road.	FS
42	34.50991	-119.57499	Pandola Station--main station (include access)	Life, Safety, Infrastructure	mudflow, flooding	Unlikely	Unlikely		Major	Moderate		Intermediate	Low		Closure of station.			FS
43	34.53148	-119.21356	Non-FS lands: Inholdings--Rancho Grande	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
44	Throughout	Canyon	Non-FS lands: Inholdings--Matilija Canyon Communities	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination. Contact landowners.	Interagency Coordination. Contact landowners.		Private
45	34.60657	-119.36543	Non-FS lands: Inholdings--Hartman Ranch/Pine Mtn Inn. (access)	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	Unlikely	Unlikely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
46	34.63806	-119.41947	Non-FS lands: Inholdings--near Potrero Seco (Dave???)	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	Unlikely	Unlikely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
47	34.55788	-119.26093	Non-FS lands: Inholdings--Faser Cold Springs Ranch	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	Possible?	Possible?								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
48	34.59783	-119.32751	Non-FS lands: Inholdings--WT. Feit Rch. (Dave? appears across stream)	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	Unlikely	Unlikely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
49	34.54665	-119.19251	Non-FS lands: Inholdings--Ojai Gun Club area	Life, Safety, Infrastructure	Flooding, mudflows.	Unlikely	Unlikely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
50	Throughout		Private lands: roads and low water crossings	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
51	Throughout		Non-FS lands: Inholdings--Sulphur Mountain, Bear Canyon, Santa Paula Creek area and surrounding areas.	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
52	Throughout		Private lands: Wheeler Springs Area (Assessed by WERT/Initial Thomas Fire BAER assessment)	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
53	Throughout		Private lands: coastal communities, Ojai, Ventura (Assessed by WERT/Initial Thomas Fire BAER assessment)	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
54	Throughout		Private lands: Ventura River area near confluence (Assessed by WERT/Initial Thomas Fire BAER assessment)	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
55	Throughout		Utility lines	Life, Safety, Infrastructure	flooding, mudflow, debris flows.	Possible	Possible								Interagency Coordination.	Interagency Coordination.		Utility
56	HWY 101		HWY 101 infrastructure, life/safety	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination	Interagency Coordination		CalTrans
57	HWY 192		HWY 192 infrastructure, life/safety	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination	Interagency Coordination		CalTrans
58	HWY 150		HWY 150 infrastructure, life/safety	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination	Interagency Coordination		CalTrans
59	Surrounding area near La Granada Peak		Non-FS lands: Inholdings--La Grandada Mountain area (multiple inholdings and ranches)	Life, Safety, Infrastructure	rock fall, debris flow, flooding, mudflows.	V. Likely	V. Likely								Interagency Coordination. Contact landowner.	Interagency Coordination. Contact landowner.		Private
60	Throughout		Archaeological sites (109 ea) Sacred site (1)	Heritage	erosion			Unlikely			Minor			V High	None	Closure, Avoidance, Signs, Erosion Control		FS
61	Cherry Creek Road		T&E Species - California condor foraging habitat	Micro-trash in California condor foraging habitat	Exposure condors to picking up micro-trash while foraging			Possible			Major			High			Remove all micro and macro-trash from 3 target shooting sites along Cherry Creek Rd. See the Wildlife BAER Assessment Report for an approximate map of locations.	FS
62	Santa Ynez River		T&E Population- California red-legged frog	Degradation of critical habitat due to degradation from debris flos and flooding	Debris flows and flooding.			Likely			Minor			Low				
63	Throughout		T&E Population-California red-legged frog	Sedimentation	Debris flows, flooding and sedimentation.			Very Likely			Major			Very High				
64	Throughout		T&E Population-California red-legged frog	Degradation of critical habitat due to degradation from debris flos and flooding	Debris flows, flooding and sedimentation.			Very Likely			Major			Very High				
65	Throughout		T&E Population-Arroyo toad	Sedimentation	Debris flows, flooding and sedimentation.			Likely			Moderate			High				
66	Throughout		T&E Critical habitat- Arroyo toad	Degradation of critical habitat due to degradation from debris flos and flooding	Debris flows, flooding and sedimentation.			Likely			Moderate			High				
67	**Throughout**		**Hydrologic Function**		**Flooding, Sediment**	**Likely**	**Likely**	**Likely**	**Major**	**Major**		**High**			**Road Closure/BAER Signs @entry points**	**Stormproofing, Clean Drainage Features**		**FS, CalTrans, Pvt**

Appendix E: Summary of Cost-Risk Analysis

Appendix F: Los Padres National Forest Treatment Map - Thomas Fire


Road Trail and Campsite Treatments
Thomas Fire
Los Padres National Forest
January 2018
Treatment
Campground Closure/Warning Signs
Day Use Area Closure/Warning Signs
Staging Area Install 1500 Ft Fencing
Trailhead Closure/Warning Signs
Road Treatment
Armor Crib Wall
Clean and Restore Channel
Drainage Armoring
Install 24 inch culvert riser and overflow dip
Install 30 inch culvert riser
Install 30 inch culvert riser and overflow dip
Install Armored Dip
Install Rolling Dip
BAER Sign Location
Road Drainage Treatment
TrailTreatments
Thomas Fire Perimeter
Soil Burn Severity
Low
Moderate
High
SESPE
WILDERNESS
MONUMENT
Ventura